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CHICAGO, DECEMBER, 1914


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## *FOR WORKERS AND LEARNERS.*

EVERY telephone man is a worker, and most of them are willing to admit that they are still learning. A good many are frankly desirous of learning more, and glad to take instruction from anyone who has proved his own knowledge of the subject. But learning is generally the hardest kind of work we do. It demands effort and concentration, to both of which there is considerable resistance. In carrying out a desire to help these students we realize that we can secure the greatest efficiency by eliminating as much as possible of the effort and concentration. This can only be done by putting this instruction in predigested form, so to speak.

That even the dryest subjects may be given almost romantic attraction has become recognized in the last few years. Instruction by motion pictures is one very good illustration of this truth. Some of the methods now used in all grades of our more progressive schools are proving daily that even children may be made intensely interested in supposedly uninteresting subjects. The famous Montessori methods of teaching are all worked out along this line. Only the student of technical subjects has been neglected because he was supposed to have enough effort and concentration at his command to overcome the resistance. He has enough, if he is not required to do anything else; but the man who gives his best to his employer all day has little left for study at night. Study he must to get ahead; and he is really in greater need of a resistance remover than even the average child, who has nothing else to do but study.

In TELEPHONE ENGINEER for January, 1915 (the next number) will start a serial designed to familiarize its readers with every branch of telephone work. It will tell not only what is done, but why it is done and how to do it. It will take up the operation and maintenance of all types of telephone equipment, from the grounded magneto farmers' line to the latest semi and full automatic apparatus; the exchange, the subscribers' station, and outside construction from overhead open wire to underground cable. And it will do all of this in the easiest possible way, without any technical or other terms that are not understood by every worker, regardless of his previous education.

The authors of this serial are Messrs. G. Willis Cummings and Arthur Kneisel. Mr. Cummings is now at the head of the Telephone Bureau of the city of Chicago, which forms a part of the Public Service Bureau, and under Commissioner Montague Ferry, performs the same function for the municipality that a public utilities commission does for the state. Mr. Cummings, in his extended telephone career, has handled successfully nearly every duty in the telephone category, in operating and manufacturing circles in both Bell and independent fields. He developed the plant department school of the Chicago

Telephone Company to a point where it is recognized as the finest educational institution of its kind in the world, and has trained nearly seven thousand men in standardizing methods of construction, installation, equipment and maintenance. This school, under Mr. Cummings, was also a clearing house for exceptional and extraordinary problems demanding immediate solution, giving him a most unusual experience not only in actual telephone work, but in making hard subjects clear to others. He is already an author of considerable renown, having written the well known text book, "Electricity and Magnetism in Telephone Maintenance."

His collaborator, Arthur Kneisel, is assistant city telephone supervisor of the city of Chicago, in which he assists Mr. Cummings in untangling the knotty problems that arise in serving the public of the second largest telephone city of the world, and the largest which has any telephone competition. Mr. Kneisel has been all through the operating telephone game, from jumper man to system manager, and has had a great deal of manufacturing experience as well. In addition to those qualifications he is a registered patent attorney and has several telephone patents of value to his own credit. He is particularly familiar with automatic and semi-automatic equipment and has served as expert in a number of important interference and infringement cases.

It is very evident that we could not have secured better talent for the preparation of such a work as this serial will be. We feel we can safely promise that it will exceed in value anything of the kind that has ever been offered to telephone readers.

Th serial will run in Telphone Engineer for a long time; but, of course, to derive the most benefit from it, every installment should be read. As the first one appears next month, every telephone worker interested in increasing his salable knowledge of the business, and so making himself more valuable to his employer and placing himself on the road to one of the "big jobs," should order Telephone Engineer for 1915 at once. Those who are already subscribers, and who are willing to see their fellow workers advance, could do them no greater favor than to call their attention to the coming serial—unless it was to make them a Christmas present of a year's subscription. That, indeed, would be the height of well-doing.

## *ASSOCIATION ACTIVITIES.*

BY adhering with absolute fidelity to the naturally severe requirements of pure Independence, with the capital *I*, the Independent Telephone Association of America has found plenty of work to keep it busy. The announcement of its second annual convention, on another page, gives some idea of the importance of the subjects it is handling; but in reading it one is apt to overlook the fact that the association is actively engaged on these matters all the time and not just around convention time.

It is obvious that the famous promise of the Bell company to the attorney general of the United States (dated December 19, 1913) means nothing unless it be actively followed up and checked up by some independent agency. The Independent Association of America appears to be the only agency that is doing this work. Even now an attempt is being made to arrange a merger or a division of territory between the Michigan State Telephone Company and the Southern Michigan Telephone Company. The state attorney general has approved it and has attempted to get the approval of the United States department of justice. At a meeting of the directors of the Independent Association, November 9, the following resolution was adopted:

*Be it resolved,* That the directors of this Association, in line with the announced policy of this Association, hereby protest to the department of justice at Washington, the contemplated merger or division of territory of and between the Michigan State Telephone Company and the Southern Michigan Telephone Company, as being a violation of the understanding between the American Telephone and Telegraph Company and the department of justice, as outlined in the letter of the American Telephone and Telegraph Company under date December 19, 1913; in violation of the Sherman anti-trust law as amended; regarding and affecting interstate commerce, and as destructive of competition in the telephone business between the states, contrary to our understanding of the position of the present administration in preserving competition, and in violation of the decree entered by stipulation by the federal government, the A. T. & T. Co., et al. in the District Court at Portland, Oregon.

It is now up to the department of justice to say whether the agreement may be violated by permission.

Literally carrying the war into the enemy's camp, the association is sending a spicy letter to its member companies calling upon them not to buy any supplies from the manufacturers of Bell apparatus; to regard the Bell manufacturers as competitors just as are the Bell operating companies; not to forget that independent manufacturers make as good telephone apparatus as there is made, and that the independent manufacturers have, in fact, made it possible for the independent operator to exist. The letter even appeals to independent men not to let Bell men, either operating or manufacturing representatives, hang around their conventions. Back, in short, to the good old days!

There is no doubt that independent men, if they are to remain independent and have independent neighbors with whom to connect, need more of this sort of stirring up. According to the Clayton bill, the Bell organization still has two years more in which it can maintain its own manufacturing plant, during which time it can sell to independent operators while independent manufacturers cannot sell to Bell operators.

The Independent Telephone Association of America is doing a splendid work in not only keeping alive, but actually nourishing and virilizing the independent spirit. And inasmuch as it is the only organization that is even attempting to do so, it surely should have the enthusiastic support of all independent telephone men.

## *NO DEPRESSION IN OHIO.*

SOME of the biggest operating telephone companies in this country have lately cut their construction work practically to the irreducible minimum. The old-time boast that the telephone business never was affected by business depression, however severe, seems to have lost its virtue. Just why this, of all industries, should take fright at the present time is not apparent to the layman; and we were inclined to class ourselves humbly in that category after studying the situation from all angles and failing to see any reason for it. We have not yet found the answer; indeed we have reached the conclusion that there isn't any, and that whatever may be the case with the steel business, the telephone business is still serene and as good as its operators want to make it. Any depression in the telephone field is purely a mental depression caused by reading too much war news and unemployment statistics.

At least the biggest and newest independent com-

pany is quite evidently scoffing at any rumors of hard times. On November 19 the directors of the Ohio State Telephone Company appropriated $350,000 for the rebuilding and extension of the Youngstown plants. This is a continuation of the big reconstruction and development program determined upon by the company soon after its organization. It has not been modified in the least by the situation growing out of the war; in fact, recent weeks have brought about a more energetic pushing of this new policy. Since the war started the company has entered into contracts for reconstructions and enlargements of plants in Cleveland, Columbus, Lancaster, London and now Youngstown. In addition, it is doing a great amount of rebuilding of long-distance lines throughout the state. The Youngstown program, which is to be started at once, includes the erection of a new building, the laying of underground conduits, the placing of an extensive system of cables underground and addition of cables to the present wire plant in all directions from the central offices. The entire equipment of central office switchboards and subscribers' telephone instruments will be replaced by an automatic system.

For several years independent telephony in Ohio has been as dead as a door nail. Not even a semblance of a state convention could be held. This year there was not only a convention, but a rousing one. The Ohio Independent Telephone Association will go on, stronger than ever. The Ohio State Telephone Company, only organized a few months ago, is acting as though independent telephony was a brand new project of irresistible attractiveness, and business was at its most prosperous tide; rebuilding old plants, buying new ones, and generally applying the energetic, aggressive tactics that always win, good times or bad.

There is an object lesson in Ohio for all the rest of the operating telephone field, independent and Bell; and for the manufacturers as well. In a moment of pessimism we may have allowed ourselves to entertain dismal thoughts, to utter ominous forebodings, even perhaps to issue retrogressive orders in an attempt to materialize our mental depression. But they are not doing it in Ohio, because the depression does not exist, either mentally or commercially; not in the telephone business.

## *CENTRAL UNION.*

EVER since telephone trade papers started we have been drawing a careful line between Independent and Bell companies. We have had to contend with many demands for diplomacy in the matter of mentioning Independent companies that were claimed to be Bell, and Bell companies that wanted to be called Independent, and Independent companies that were really Bell, but would not admit it. But never until the Central Union Telephone Companies of Ohio, Indiana and Illinois began to operate under the direction of receivers did we have a company that was neither Bell nor Independent.

The court order creating the Central Union receivership makes it quite plain that the company is strictly independent; but please note that the word is spelled with a small *i*. That means that it is independent of the Bell; but it is also independent of the Independents. It is the most independent of all telephone companies. It answers only to the court, who is presumably not a telephone man, and whose only dictate is that it stand on its own bottom.

Whatever its proper political classification, if any, may be, it may be most emphatically stated that the Central Union under receivership is *not* a Bell company in any sense. Whether it will ever again become one is a matter for time and litigation (which are synonymous) to decide. At present there is no reason why Independent telephone manufacturers should not sell supplies to it and Independent operators co-operate with it. Judicious handling might make it eventually Independent with the capital *I*.

## *COST OF MEASURED SERVICE.*

TELEPHONE rates based on a charge per call instead of per month—measured service, that is—has always had our hearty indorsement as the only logical and efficient method of charging for service. It has been the objection of the telephone using public that measured service generally costs more per call than unlimited service—which, of course, is true. Individual users on unlimited service can, by inordinate activity in using the telephone, cut their cost per call to a very low figure. It is perfectly obvious that a man putting in fifty calls a day, or six an hour, with his service costing him $125 a year (Chicago's old unlimited business rate), would be getting service at less than a cent a call. But it is equally plain that if every subscriber to this same class of service was as free with the telephone, the whole service would rapidly become demoralized.

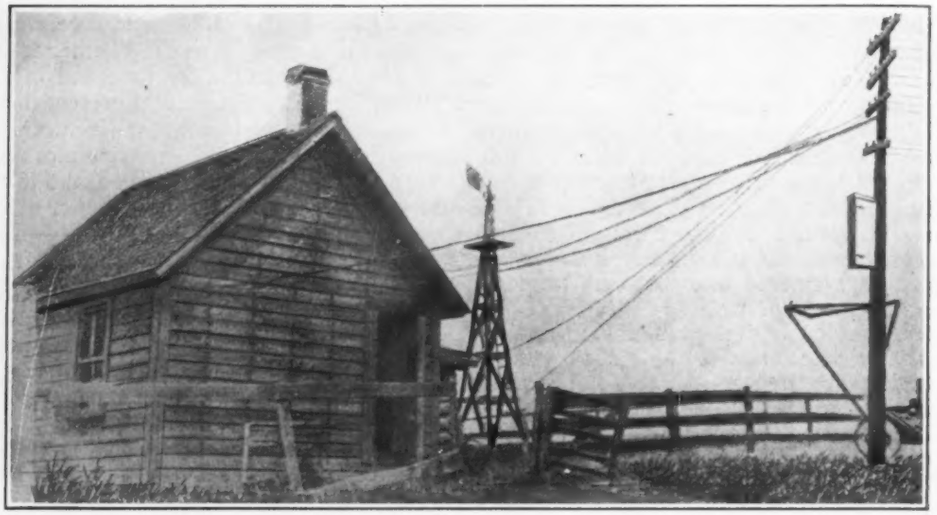
Let us suppose that for every user of fifty calls a day at $125 a year, as in the above case, there is also a user of eight calls a day paying the same rate. The average then would be about three cents a call, which would give the operating company a living rate. Theoretically, then, a measured service giving 350 calls per month at $125 a year, with extra calls chargeable at three cents apiece, would give the operating company the same income and equalize the rate.

The trouble is that it does not work out that way. The reason is plainly seen. When an operator must take reckoning of each and every call, the cost of operating runs up; the operator cannot handle as many connections per hour, and the consequent cost per call is increased. If the work of checking calls is delegated to automatic counters, either at the exchange or at the subscriber's station, the extra investment in apparatus must be considered as well as its maintenance and accounting. Whatever method is employed, the cost must be distributed to the connections. So naturally measured service costs more per call than unlimited service.

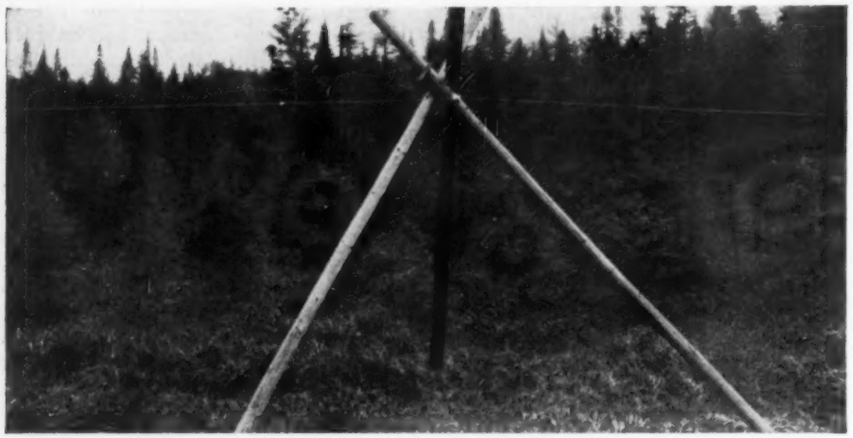
Hiring a salesman on a commission basis assures his getting paid for the work he does, and only for that. But if he is paid a flat salary he must make good on a cost per sale basis anyway. If he fails, he can be discharged. Unfortunately the telephone subscriber who secures an inordinately low rate per call by excessive use of his flat rate telephone cannot be discharged, and his rate cannot be raised because he has the advantage of a certain classification. So we assume that measured service is even more equitable to all concerned than commission employment. But the fact remains that the *average* flat rate subscriber, whose rate per call is barely profitable to the operating company, becomes unprofitable as soon as he is changed to measured service because it costs more to serve him and keep track of his calls.

For the most equitable distribution of charges measured service is unquestionably the answer. But for the cheapest possible service, or the most service for any rate, the uncounted, catch-as-catch-can flat rate system must continue to hold our interest.

*One End of a Long Distance Checker Game Recently Played in Chicago.*

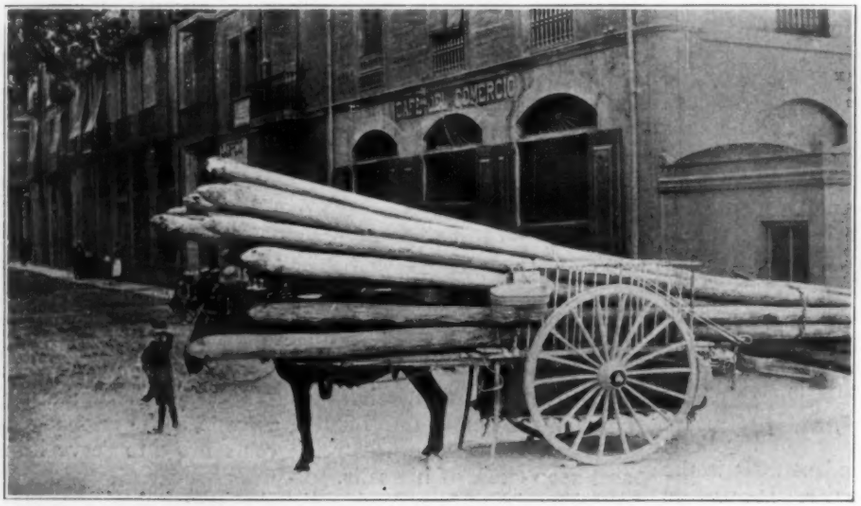


*Exchange of the Pass Creek Telephone Company, Located in the Center of a Big Wheat Field, About Twenty-four Miles Northwest of Bozeman, Mont. The Operator Is One of Those Sweet, Gentle and Unassuming Girls Living So Close to Nature That Shoes Would Be a Burden. This Exchange Is Surely in a Rural Community If Ever There Was Such, for the Nearest House Is Three-quarters of a Mile Distant. Yet This Exchange Furnishes Service to One Hundred and Three Subscribers Locally in the Community, and With the World, Over Two Metallic Toll Lines.—Mountain States Monitor.*



*Tripod Pole Construction Used in Crossing a Tamarak Swamp in the Adirondacks.—From the Telephone Review.*

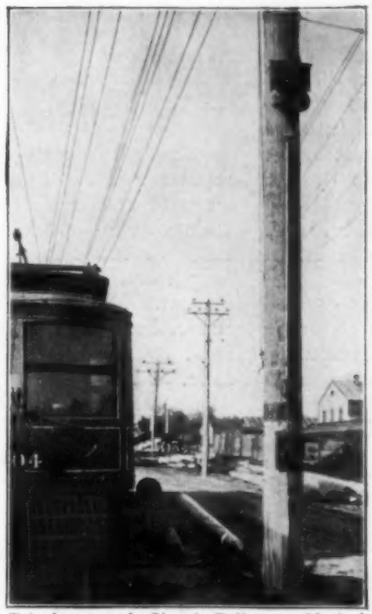
*Signal Tower on Bald Mount in the Adirondacks, Used By the Government Fire Rangers. The Telephone, of Course, Is in the Little House, While a Coil of Wire Will Be Noted Hanging at the Base of the Lower Outside. The Rangers Maintain a Constant Lookout for the Telltale Curl of Smoke or Spark of Flame That Speaks of an Incipient Forest Fire. As Soon as Such an Indication Is Sighted the Ranger Discovering It Telephones to All the Other Ranger Camps in the Territory and the Guardians of the Forest Gather to Fight the Flames.—Telephone Review.*




*Method of Hauling Telephone Poles in Spain. The Photo Was Taken at Lerida, Provincad Catalonia, By John Rippey. The Illustration Is Somewhat Deceptive in That the Mule Shown Does No Actual Pulling, but Acts Merely as a Guide for Four Other Mules, Hitched Single File Ahead.*

**STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.**

*Telephone in Shelter Booths Along the Right of Way of the Milwaukee Electric Railway and Light Company.*



*Telephone and Signal Bells on Marked Poles Along the Right of Way of the Milwaukee Electric Railway and Light Company.*

*Commercial Switchboard and Public Board of the Milwaukee Electric Railway and Light Company.*

*The increasing use of the telephone for dispatching trains has led to its adoption by some of the leading electric street railway companies. An equipment that is one of the most complete of its kind has been put in operation by the Milwaukee Electric Railway and Light Company. Three switchboards are in service—one for the train dispatchers, another for handling calls within the building in which the offices are located, and a third for handling public telephone messages, operated by the Wisconsin Telephone Company. The train dispatcher's switchboard is a Western Electric six-panel three-position board, with two of the positions in service. The equipment is sufficient to talk to the 240 telephones located at various points along the car lines. These telephones at transfer points and track intersections are mounted on poles distinguished by broad yellow bands painted on them a short distance above the telephones. The telephone instruments are of two kinds—the metal box type operated on central battery within the city, and the familiar Western Electric No. 117 magneto wood telephone for the outlying districts. The latter are enclosed in shelter booths. There are also twenty-five loud-ringing call bells mounted on poles with the telephone instruments and used to signal the supervisors. They are operated from the train dispatcher's switchboard. On the top of the switchboard in the first position is placed a small lamp signal box which indicates open bridges or closed steam railway gates, thus enabling the dispatcher to note the location and length of all delays to traffic. Harmonic ringing is used. The dispatchers handle 490 trains and receive approximately 3,900 calls daily. In all 1,600 miles of telephone circuits are operated a part of the telephone lines being in lead-covered cable, of which there is a total of eighty miles.*

*Train Dispatching Switchboard of the Milwaukee Electric Railway and Light Company.*

*Test of a Cavalry Telephone Test, U. S. Army, Fort Leavenworth, Kansas.*

*Wire Chief, His Desk and Terminal Room of the Milwaukee Electric Railway and Light Company.*

**STORIES IN PICTURES OF TELEPHONE PRACTICE AND PROGRESS IN ALL PARTS OF THE WORLD.**

## Ohio Independents Meet at Columbus

More than six hundred delegates and visitors attended the annual state convention of the Ohio Independent Telephone Association, which was held at the Hartman hotel, Columbus, November 12 and 13. Interest in the convention this year reached the highest point because of the impetus given the independents by the consolidation of the independents into the Ohio State Telephone Company, of which Samuel G. McMeen, president of the Columbus Railway, Power and Light Company, is president.

The formal program of the convention was opened at 10:30 o'clock Thursday morning, when Mayor George J. Karb formally welcomed the delegates to Columbus. The response to the address of welcome was made by W. P. Bogardus, of Mt. Vernon. Frank L. Beam, of Mt. Vernon, president of the association, followed with his address, which mainly touched on the history of the telephone business and a review of the independent telephone business, which had its inception in Ohio in 1894. Thus the present convention celebrated the twentieth birthday of the founding of the independent telephone business in Ohio.

The association has not held a convention for two years.

According to the address of President Beam, the development of the independent telephones in Ohio was phenomenal for a period of 15 years after the first exchange was installed in 1894. Up to 1894 the Bell telephones, which held the undisputed field for 16 years prior to that time, had but 30,000 telephones in Ohio, and but 300,000 in the entire country. In 1909 the total in Ohio, Bell and independent, was about 500,000. The Bell companies now operate 242,364 telephones in Ohio and independents have 400,287, a total of 642,651. It is estimated that there are nearly 10,000,000 telephones in the United States at the present time.

President Beam declared government ownership of the telephones would result in unsatisfactory service and would result in a real hardship, pointing out the inadequacy of the service under government control abroad. He declared that all indications pointed to a revival of interest in the independents such as dominated them between the years of 1894 and 1909. Extension of long distance facilities, he declared, made the merger into the Ohio State Telephone Company imperative. The independents of Ohio, he asserted, comprised over 35,000 stockholders, with investments totaling between $40,000,000 and $50,000,00.

A discussion on the subject, "Why Revive and Strengthen the Association," led by H. P. Folsom, of Circleville, G. P. Thorpe, of Wilmington, and W. F. Laubach, of Akron, followed Mr. Beam's address. The appointment of committees followed. Samuel G. McMeen closed the Thursday morning session with an address. The topics for the afternoon program included an address by F. B. McKinnon, secretary of the National Independent Telephone association. His subject was, "The United States War Tax on Telephone Messages." The general appraisal committee through Secretary G. R. Johnston, reported on "Telephone Appraisals Under the Order of Public Utilities Commission." An open meeting for discussion followed. Election of officers completed the afternoon's business.

The annual banquet was held Thursday evening at the Hartman hotel, at which a number of talks were given. The program adjourned Friday night with addresses by W. S. Vivian, H. D. Currier, B. C. Groh and others.

## Telephones for Irish Farmers

Consul Wesley Frost, Cork (Queenstown), Ireland, reports that the British postmaster general is seeking to increase the use of telephones among the farmers of Ireland. A special rate has been arranged whereby three or more farmers on a line not over one mile in length can have unlimited local calls at $14.60 each per annum. No line will be established for less than three subscribers; but subject to this restriction lines may be used by subscribers not closer together than two in a mile, at the rate of $17.03 per year. Subscribers must, of course, be located on the same road or route from the central or town exchange. For calls beyond the limits of the town exchange a charge of 2, 4 or 6 cents per conversation is made according to distance within a 25-mile radius, or of 12 cents within a 50-mile radius. The extreme radius is about 100 miles.

From the statements issued by the secretary of the general post office at London in advertising this new plan, it is evidently regarded as a means of ameliorating rural conditions in Ireland and of augmenting comfort and industrial efficiency. The multifarious uses to which telephones may be put are set forth as attractively as possible, such as obviating business trips, expediting sales and purchases, carrying on co-operative dairy societies, summoning professional aid, promoting social intercourse, and the like. "In the United States," it is stated, "there are today more telephones in use by farmers than the whole number in use by the commercial and all other classes in the United Kingdom, and these telephones are found to add to the profits and comforts of the farmers to an extent which makes the cost of the telephones seem negligible." Whenever an application is received by the secretary a personal representative visits the community from which it comes and aids in the organization of a telephone line.

## Pennsylvania Independents Convene

The convention of the Eastern Pennsylvania Independent Telephone Association opened November 5, at Reading, Pa.

The opening address was delivered by William B. Given, of Columbia, president of the Consolidated Company. This was followed by an address on "Independent Telephony," by J. G. Ihmsen, of Buffalo, assistant president of the Federal Telephone and Telegraph Company.

At the afternoon session there was a paper on "Contract Department," by I. D. Gindhart, Jr., of the Keystone Telephone Company, Philadelphia. This was followed by an address on "The Importance of Standard Operating Methods," by W. S. Vivian, of Chicago. H. E. Bradley, of Philadelphia, secretary of the Eastern Traffic Association, reported on "Standardization of Toll Lines."

Reasonably adequate telephone connections with office buildings and grounds is made compulsory for Michigan railroads, under regulation of the State Railroad Commission, by Act 201 of the present legislative session. The bill gives the commission power, upon complaint, to make an investigation, and "fix a reasonable regulation, practice or service to be installed, imposed, observed and followed in the future."

# Communication To and Between Trains

*Presented Before the Seventh Annual Convention of the Association of Railway Electrical Engineers*

BY DR. FREDERICK H. MILLENER

THE commodity most in demand in the world today, and that which the world will pay the highest for, is speed. The second is safety, as safety lowers the price to be paid for speed, and any instrument or thing which will add to these two great commodities must have a value to mankind.

Few of us realize the rapidity of the changes and improvements which are taking place around us. Little over half a century has elapsed since the close of the Civil War, and yet never in the world's history has there been so great a change in a like period of time in the social, military, civil and mechanical customs of the world, and this country in particular.

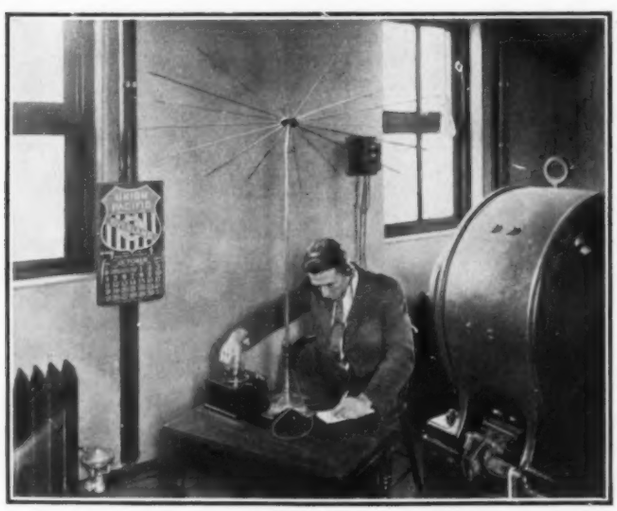
Some investigator announces to the world a successful laboratory experiment, the next decade or so sees it indispensably connected with our commercial life, and wonder is expressed that we were able to do without it before. Thus it is with the wireless.

*Dr. Frederick Millener.*

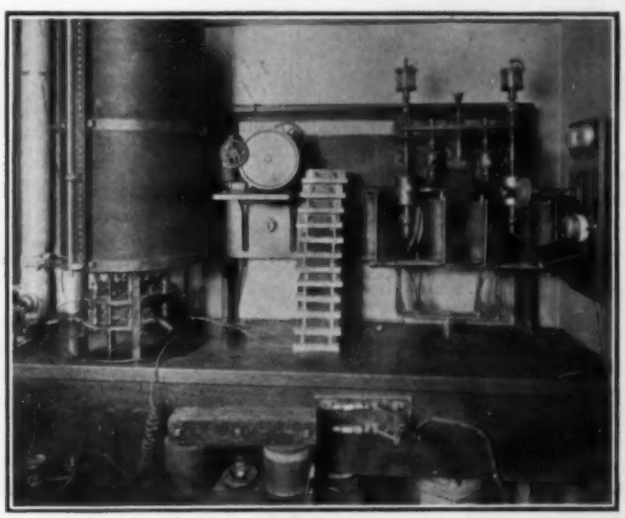
I wish to call attention to the difference between a laboratory experiment and one which has been worked out in detail and perfected. The inventor announces his discovery because, of course, he wishes as much credit as is due him, for unfortunately, in this country, many times that is all he gets out of it. So, in wireless, the child has thus been taken for the man.

For at least a century before an electric impulse, representing a signal, had actually been transmitted and received without intervening and connecting wire coupling, the subject was a favorite one with the physicist, and it is not unlikely that the ancient Greeks, who witnessed Thale's experiment of transferring energy from amber to neutral paper, dreamed of the bridging of greater distances by the same wonderful influence.

The first recorded instance, however, in which a definite scheme was proposed having for its object the telegraphing without wires by electricity, was that given by Silva, a Spanish physicist who read a paper "On the Application of Electricity to Telegraphy" before the Academy of Sciences on December 16, 1785, at Barcelona. He advocated that a given area of earth be positively electrified at Mellorca and that a similar area of earth be charged to the opposite sign at Alicante; the sea connecting these two cities would then act as a conductor when the electric difference of potential would be restored and by a proper translating device the transfer of energy could be indicated.



*Receiving Message by Radiophone Receiver—No Wires to Ground.*

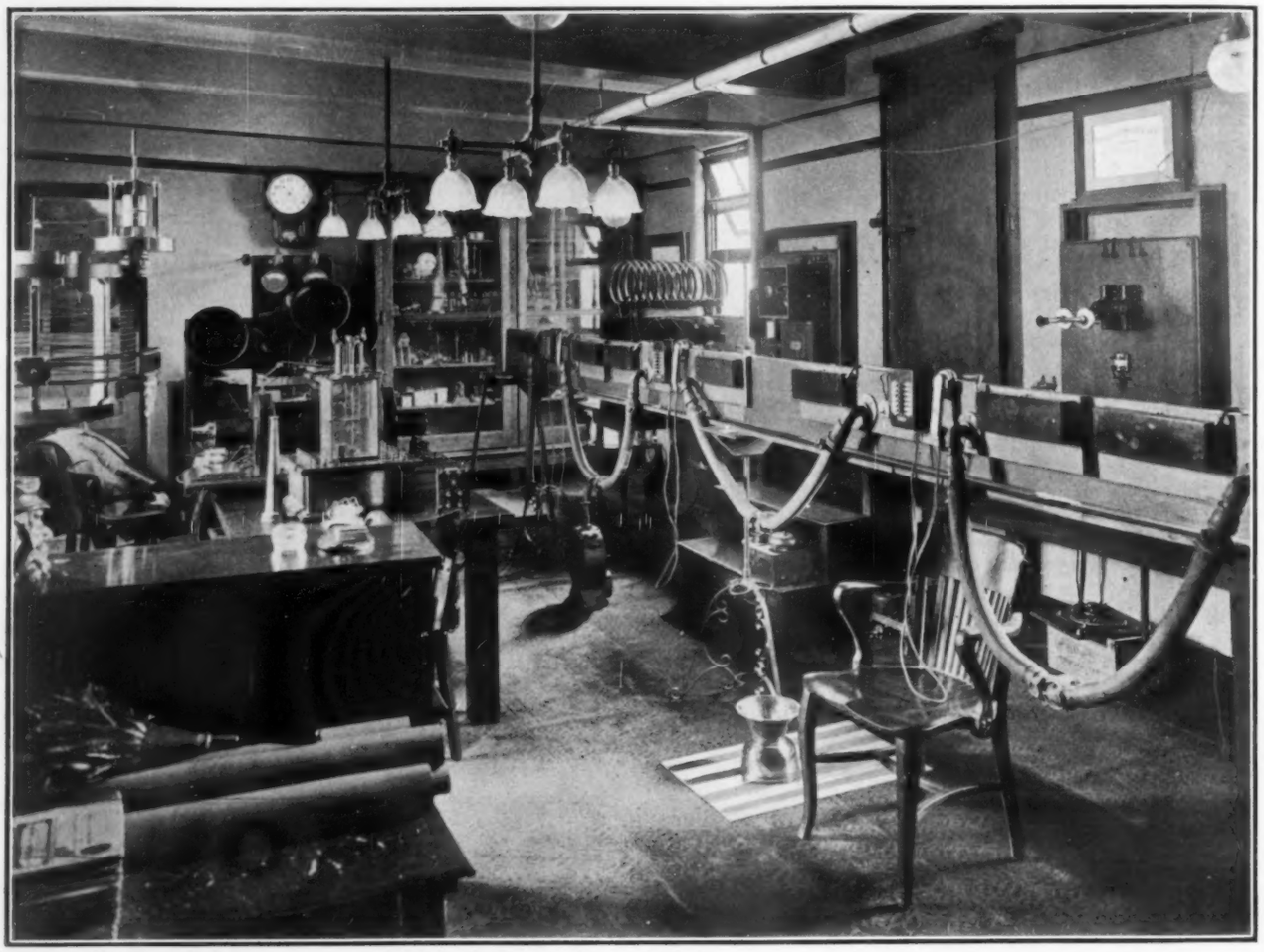


*Wireless Telephone Generating Apparatus.*

But the greatest benefit of wireless investigation has come as the result of the telegraph and telephone, the invention of the telephone receiver by Alex Graham Bell, the researches of Hertz, Marconi, Braun, Slaby, Arco, Fessenden, DeForest and others, all have furnished their contribution to what is now known as the wireless.

At this point it might be interesting to note that in 1857 a telegraph superintendent in France outlined in *L'Illustration*, a French paper, a complete description of a telephone, which, however, he did not follow up. The French Government recently, however, in recognition of this fact, made Bourselle a member of the Legion of Honor.

I purpose to explain in part a new departure or field for the wireless, or, at least, the researches which I have had the honor of conducting for the Union Pacific Railroad.



*Laboratory Model of Train of Four Cars Connected Together by Wire Connections Inside the Air Hose.*

### WIRELESS SIGNALS—THE COHERER

In 1906 the Union Pacific Railroad management ordered me to devote my time to finding a method of signaling the cab of a locomotive or communicating with a train without interfering in any manner, or placing any obstruction along the right of way. For this purpose the services of a storage battery electric truck were utilized. The machine weighed 5,500 pounds, with the batteries in place, and was made of iron and steel and ran around the shop yards on a narrow gauge track. The car was built by the Westinghouse Electric Manufacturing Company and power was developed by a series wound motor. The car was equipped with an aerial or antenna, and many and thorough experiments were tried with it. The car was caused to back and move forward at four different speeds, ring a bell, etc., at the will of the person at the wireless key. Antennae were placed on buildings alongside the track; various methods were used to receive the impulse on the car and transform it into mechanical motion; the practical application of this experiment lay in the fact that the iron and steel car was a capacity in itself and therefore it did not make any difference whether we had a good ground connection or not, as the car would work just as well when it was insulated from the ground as when connected directly by wire. This electric truck has been very valuable for experimental purposes, because it had 186 volts direct current and plenty of power. However, on a railroad, a danger signal must operate at least 100,000 times in succession without a failure, and must not be operated by any other means than the means intended, and as the lighting of an arc light or atmospheric disturbances will sometimes throw the signal, and as the best coherer or valve detector will not last for anything like 100,000 operations without a failure, we therefore discontinued work on the mechanical wireless cab signal, although no difficulty presented itself which could not be overcome,

except that it was not reliable. This was one of the earlier reasons why the coherer was displaced in wireless telegraphy as a detector and the telephone and other instruments substituted.

WIRELESS TELEGRAPH

Before proceeding I should state that the West is a country of magnificent distances. People think nothing of coming to Omaha from places two, three, four, six and even eight hundred miles away for provisions, entertainment, etc. Such a country develops its population on the same broad lines. For miles and miles there are no trees, and you can frequently see along the track a long line of telegraph poles which have been put out of business by ice and a heavy wind storm.

So it seemed that in such a country as that there might be a chance for the wireless.

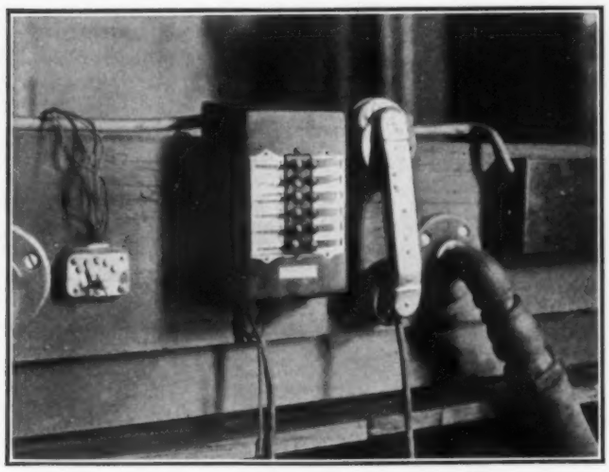
The next work I therefore undertook was wireless telegraphy between stations. Although the wireless has taken its proper place at sea and the work done very interesting, instructive and practical, wireless telegraphy has not been exploited on land to the same extent, principally because there has been no demand for it, the wire telegraph and telephone apparently fulfilling all that was required.

When Samuel F. B. Morse in 1844 invented the telegraph, he built, if you remember, the first line a distance of 40 miles, from Baltimore to Washington, and the privilege of sending the first telegraphic message was given to his friend, Miss Annie G. Ellsworth. That first message ever sent over the wires read:

*"What hath God wrought."*

If it was appropriate at that time to send those words, how much more appropriate is it today, when we telegraph and telephone without wires through limitless space, to say, *"What Hath God Wrought."*

For 600 miles west of Omaha the country is comparatively level and straight. The elevation at Omaha is 1,200 feet, gradually rising until an elevation of 8,000 feet is reached at the summit of Sherman Hill, Wyoming. In planning for wireless telegraph stations this elevation must be taken into consideration.



*Interphone Equipment for Each Car—The Buttons Are Labeled on the Front of the Switch Box at Baggage, Diner, Pullman, Observation, Long Distance and Wireless.*

Another thing which enters very closely into the consideration of the subject is static electricity. In summer the static electricity between Green River and Cheyenne, Wyoming, and Sherman Hill, Wyoming, causes all sorts of disturbances with block signals, burning them out, and occasionally putting the wire telegraph out of commission. Therefore, as a result of experiment, it was decided that the induction coil method of generating wireless impulses, or waves of the 60 cycle alternating current variety would not be satisfactory, for even if nine messages out of ten were received properly and the tenth not so, fate would in all probability make that message the most important one. Various schemes were tried but it was found that the best results could only be secured by using a higher frequency than 60 cycles. Another fact which enters into the consideration of wireless stations in the West is the absence of direct current. All electric installations, being comparatively new, are alternating current, and of the latest design. It, therefore, appears that if 60 cycles could be used, it would materially cheapen the installation and for very small intermediate stations it can be used, but not where static electricity is prevalent or usual, as the musical note in the receiver is so low that it is confused with the atmospheric or static electricity. However, for the stations at North Platte, Nebraska, Green River and Cheyenne, Wyoming, it was planned to use a frequency of about 550 cycles transformed up to about 12,000 volts in an open core transformer, with a 5 kilowatt generator at Cheyenne and a 5 kilowatt at North Platte, and a 10 kilowatt at Green River. The station at Cheyenne is to work at all times day or night at least as far east as Omaha, and we hope an equal distance the other side of the mountains. The four stations, Omaha, North Platte, Cheyenne, and Green River, will thus work together at all times, and in all conditions of weather. In the telephone receiver the message from a high cycle high frequency station is a high pitched note, similar in character to the sound of a tuning fork at 1,020 vibrations per second and is much pleasanter to listen to than the old 60 cycle low note. The sound also being high in pitch is not confused with static electricity; thus one of the greatest difficulties of the earlier wireless investigators is done away with.

*Car Coupling for Composite Wire and Wireless Telephone.*

AERIALS OR ANTENNAE

In railroad work it is absolutely necessary to have your antenna close and compact. In the first installation of the wireless telegraph station it is important not to complicate matters. Make the antennae simple and easy to repair; endeavor to utilize men in the employ of

the railroad and not import experts, as this will only cause trouble, fault finding and dissatisfaction. The work is not so difficult but what the average person can understand it if properly explained and it is only mysterious because it is new.

I do not mean that to be a reflection on the employment of expert assistance, but if we put stations out in the country where it is difficult to get good men and keep them, and do not educate our own men who own property and are assisting in the development of the country it will have a tendency to breed discontent. It has been, and is the policy of the Union Pacific, through its educational department, to carry out this plan.

We have to have experts, but we do not have to have an expert at every station who knows more about it than the man who installs the plant.

The present tendency is toward using complicated apparatus. This is not necessary; the simpler the better. It had been found that the use of the flat top ships' antenna is more practical than the umbrella type at stations, and parallel to the track, elevated by two self sustaining towers, the height of which should be at least 210 feet and should be constructed to stand a wind stress of 90 miles per hour, at least, as we are building the wireless to work, when the wires go down. The umbrella antenna requires too many guy wires and at the critical moment falls down from wind, snow and ice. It is also difficult to repair in the yards or at stations as it would take up too much room. The flat top or ships' antenna—if it becomes covered with ice—can be quickly lowered, repaired and raised by four men who are not necessarily skilled help. The wireless stations should be close to the train dispatcher's office, for if the storm destroys the telegraph wires, it may wreck the local telephone outfit.

The flat aerial may be rendered somewhat directional by the position in which it stands and where the wires lead into the station. Another reason for getting closer to the tracks is that the wireless wave will be rendered directional by the tracks and will travel farther with the rails than in other directions, or in other words, the signals may be rendered more intense east or west as desired. It frequently happens that a wireless message seems to travel up a stream of water or where there are metallic conductors much better than the same distance over plains or wooded country. A person is almost led to believe that buildings, trees, fields, etc., act on the wireless wave as the damp pedal of the piano acts on the vibrating musical cords, thus grounding the waves.

The principal objection to the flat top aerial is its cost, as it requires two towers to support it instead of one.

### APPARATUS

One of the first real difficulties met with in wireless telegraph work is the selection of proper apparatus. Each firm or system will exhibit patents which appear to cover all they claim, in fact, gives them a monopoly of the ether. However, this is being rapidly attended to, as the Marconi Wireless Telegraph Company is in litigation with several American companies at present, and it will possibly have a certain amount of influence in cleaning up the patent situation.

What I particularly wish to call your attention to in the above statement is that about the time Alexander Graham Bell was working in the telephone field there were numberless improvements and patents and endless litigation, and finally there had to be a great trial and the decision of the United States Supreme Court settled the matter. Then capital took hold and we had the beginning of the system that we have today

In England at the present time the wireless telegraph is operated in connection with the post office. For more than three years we have been ready to install a wireless telegraph equipment on the Union Pacific Railroad, but for various reasons, not connected with the wireless, it has been postponed. In the meantime, I have turned my attention to other work, the development of a wireless telephone.

### THE WIRELESS TELEPHONE

In March, 1911, I read a paper before the New York Railroad Club on the wireless telegraph and the railroad, and about one week before going to New York I had completed my first wireless telephone; that is, I had made it talk. Since then I have continued work on this apparatus, and, I believe, have now placed it beyond the mere experimental stage. The apparatus is designed to be a composite telephone; by that I mean we are going to talk by wireless, and, using part of the same apparatus, talk by wire. In other words, the machine is an intercommunicating telephone from car to car, a long distance wire telephone when the train is stopped at a station, and when the train is in motion between stations, a wireless telephone by means of which we talk to the train ahead, the train behind, or the station. The device is so arranged that while talking from car to car it is selective talking and selective signaling. While talking long distance by wire, only one person can talk from the train at a time, and the train is connected to the city trunks. On leaving the station, from any car you can call the baggage car, requesting connection with the wireless generator.

As soon as that is done, the party can commence to talk. The distance which the message travels is the distance from the aerials on the train to the wire telegraph lines alongside the track. A pair of these wires have been balanced up and equipped with condensers around the telegraph instruments, and are used as an antenna.

Four years ago in my talk in New York City I described a means by which these messages could be received, and I had arranged a very simple one. You must know that at times people have to be shown, and sometimes they believe that you are endeavoring to deceive them, using concealed wires, or something of that sort, so in order to have their minds free, I equipped an umbrella with a tuning apparatus and allowed them to walk wherever they pleased around the shop yards, and we talked to them by wireless telephone.

I noticed, two years later in the *Scientific American*, that people a few miles from the Eiffel Tower, Paris, France, by means of a similar device, were able to receive the time signals, the ribs of the umbrella acting as the antenna or aerial capacity, and their feet and body the ground connections.

In an issue of the *Scientific American*, October 24, 1914, I find the following article:

### "WIRELESS" AUTOMOBILE TOP IN WAR

A report from Belgium by the correspondent of an English automobile trade journal tells of a most extraordinary use of an automobile top. It seems that a British patrol succeeded in capturing a German touring car in which two officers were seated. The motor had broken down and the officers were made prisoners of war. In glancing over the car one of the patrol noticed a wire connection to the "skeleton" of the raised top. Following the wire he pulled from under the seat a telephone receiver, and, holding it to his ear, was dumfounded when he could plainly hear a message coming from nowhere in particular. The top-skeleton formed the receiving wires of a wireless telephone station, and the message came from the nearest headquarters of the army corps to which the officers belonged.

# Minneapolis Gets the Independent Convention

*Independent Telephone Association of America Annual Event January 19 to 21*

BY W. S. VIVIAN

SINCE its directors have adopted a new policy of taking the convention to a different city each year, the Independent Telephone Association of America announces its second annual convention to be held at Hotel Radisson, Minneapolis, Minnesota, January 19, 20, 21, 1915. These dates are to be red letter days to the independent telephone men for the year 1915. At this convention a splendid program will be given which will review the work undertaken since the preceding convention. A summary of the negotiations with the American Telephone & Telegraph Company in the Association efforts to secure a toll line contract that will be fair and equitable to the independent telephone industry will also be presented.

*Hotel Radisson, Minneapolis, Convention Headquarters.*

A report from the accounting conference covering its conclusions and recommendations will be made. This conference was attended by representatives of the Interstate Commerce Commission out of which a permanent committee has been appointed to cooperate with the Interstate Commerce Commission in all accounting matters affecting telephone companies.

A report will be given showing the progress made in securing the adoption and use of uniform methods and practices in local and long distance operating. Important papers will be given touching many phases of our industry.

This makes a program that no company can afford to miss; a program that will create enthusiasm and determination to realize the greatest possibilities of independent telephony.

The manufacturers and supply dealers will be on hand with the largest and best exhibits ever displayed. Important developments and improvements in the manufacture of apparatus have been made during this past year. To telephone men generally this will be the first opportunity to see what these developments are. The manufacturers and supply dealers are co-operating with the Association to make this a splendid, representative meeting.

Many will be surprised that the convention has been moved away from Chicago. They have learned to think of Chicago almost as the home of the annual convention. It is true that Chicago has unlimited convention facilities, that it is nearly in the center of the country, east and west, and that all railroads terminate in Chicago. All of these points the directors thoroughly considered, and after considering, decided to move the convention to Minneapolis for the following reasons:

*First:* It will give hundreds of independent telephone companies operating within a radius of three or four hundred miles of Minneapolis an opportunity to attend a national independent telephone convention for the first time, and by moving from city to city each year ultimately every small company in the United States will have an opportunity to attend a national convention. This immediately does away with the reason given by some companies this past year that they would not join the Association because they could not attend the conventions, they being held so far away.

*Second:* In the city of Chicago the Association has never been able to get a proper or fair amount of newspaper publicity, and by going to different sections of the country it is expected that the newspapers will give the event a great deal more space, and further, give the Association an opportunity to mold public sentiment favorably to independent telephony.

*Third:* It will enable the Association to be of some assistance to the independent company operating in the city where the convention is held by showing that community that the independent telephone business extends throughout the length and breadth of the land, and is not simply a local proposition.

*Fourth:* The Association hopes to be able to get many more new companies as members by means of this policy.

Some may object to going so far away from Chicago; but even to the companies south or east it means only the extra expense represented by one night's ride from Chicago, and this we all know is a very small part of convention expense. Minneapolis is a beautiful and interesting city, worth a visit at any time.

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## Telephones in Kansas Schools

The November number of TELEPHONE ENGINEER contained, on page 197, a short article on telephones in country schools in Kansas. H. N. Williams, manager for the Holyrood Telephone Company at Holyrood, Kansas, states in a letter that his company has at present five country schools on its lines, the first of which was equipped in 1909. They are on country party lines, classed with rural line telephones at the same rates, and the community served would not think of doing without the school telephones.

# European Telephone Development

*Translations from the Foreign Press and Communications from European Engineers*

BY FRED W. SCHOLZ

IN the last number of TELEPHONE ENGINEER we considered the theoretical points regarding automatic telephones when used in small group and party systems, and this article, a continuation of the former, will take up the more technical parts. The technique of automatic small group systems is built upon the investigations extending from 1906 to 1910. The statistics gathered within those four years comprise: (1) The simultaneous traffic of a group of 10 to 20 subscribers, dependent on the number of connections per day. (2) The degree of efficiency and working factor of the small group systems, depending on the number of lines available for service. (3) The influence of the size of groups (number of connections) upon the simultaneous traffic with a constant number for the total traffic. (4) The concentration of the conversations carried on. (5) The average time for calls and the variations when compared to the average. (6) The ratio between the number of internal calls per group and the total traffic of the entire group per day. (7) The percentage competition of the connections within the group and those without the group, when both connections are desired at the same time. To answer all these questions satisfactorily an automatic registering device was perfected, known as the chronograph, which was used for this purpose. A similar device was described in TELEPHONE ENGINEER, May, 1914, in the article by W. L. Campbell on "Traffic Studies of Automatic Systems." As the two instruments are about the same in construction, we need not to go into their description and can pass over to the results obtained by their use.

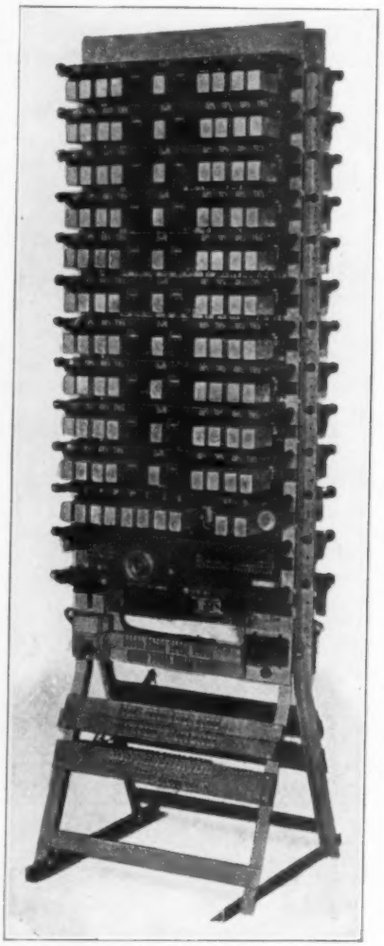

*Fig. 1. "Silent-Exchange" for Rural Automatic Systems.*

1. By connecting the various elements of the chronograph to the test lines of the multiple panels in manual systems, and by connecting the chronograph to the corresponding parts in automatic systems, results such as shown in Table 2 were obtained. The

TABLE 1. TOTAL NUMBER OF CONNECTIONS PER GROUP AND PER DAY.

| | Daily connections of the subscribers | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII | IX | X |
| 129..... | 1 | 1 | 21 | 11 | 8 | 32 | 16 | 5 | 20 | 24 |
| 155..... | 34 | 1 | 14 | 45 | 27 | 4 | 3 | 13 | 13 | 1 |
| 141..... | 1 | 16 | 11 | 40 | 12 | 16 | 9 | 3 | 13 | 20 |
| 147..... | 25 | 47 | 13 | 32 | 7 | 0 | 3 | 9 | 5 | 6 |
| 104..... | 10 | 0 | 28 | 7 | 15 | 4 | 6 | 8 | 17 | 9 |
| 179..... | 23 | 0 | 26 | 17 | 15 | 9 | 16 | 15 | 21 | 37 |
| 181..... | 38 | 69 | 5 | 12 | 7 | 8 | 9 | 18 | 4 | 11 |
| 132..... | 3 | 3 | 18 | 10 | 16 | 42 | 5 | 7 | 21 | 27 |
| 181..... | 8 | 21 | 18 | 8 | 13 | 15 | 16 | 19 | 28 | 40 |

same table shows that in a small group of ten instruments, two trunk lines are sufficient for 200 daily conversational minutes, i. e., about 100 connections per day.

These two lines meet conditions in that they accommodate about 99 per cent of the traffic demands under the given conditions. For such high efficiency degrees for a utilization of the trunk lines on hand, the number of "busy" cases due to insufficient number of trunk lines corresponds to the number of "busy" minutes. We would then have, in agreement with the efficiency degree found, $100-\frac{3.5}{246}=98.6$ per cent, a degree of effectiveness of $100-\frac{3.5}{142}=97.8$ per cent, i. e., the various subscriber with an average number of calls equal to *3*, would find that about twice a month he would be unable to make connections, finding a busy trunk wire, and would have to wait a minute or two to get his connections.

The efficiency degree is equal to the ratio between the utilized traffic time and the total traffic time possible; the effectiveness degree is equal to the ratio between the number of connections possible at time of calling and the total number of connections. In addition the results show great variations between number of connections possible and actual connections made, as an examination of Table 1 readily shows.

In order to obtain efficient working conditions in small party systems with small sub-exchanges, using the smallest form $G\frac{10}{11}$, all that is needed is that the sum of all connections shall not exceed the 100 mark by too much. The degree of efficiency of such a small group system rises exceedingly when we pass from one trunk line to two trunk lines. Further than that we need not go, as the gain by the use of three or more trunk lines does not bring a corresponding increase in traffic efficiency. The efficiency of a group when passing from one to two trunks increases by five times the former conditions, whereas with an increase to three trunks we get hardly more than two per cent betterment. There must be added the factor that the additional cost of installation would be too high in comparison to the results obtained. It was estimated that the increase of installation cost would be 30 per cent, and the returns only two per cent, so that it is uneconomical on the face of it.

The use of two trunk lines per ten-group seems to

give good results even under abnormal traffic conditions. The concentration of traffic, i. e., the ratio of conversation-minutes in the busiest hour to the total number of

TABLE 2. RESULTS FROM AUTOMATIC AND MANUAL TRAFFIC STUDIES.

| Lfd. No. | Zm | Z | 1 connection | 2 connections | 3 connections | 4 connections | 5 connections | Value for G 10/II for— T | η in % | t in Min. | φ in % |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 8.5 | 170 | 197 | 37.5 | 8.7 | — | — | 289 | 97 | 8.7 | 3 |
| 2 | 8.3 | 166 | 162 | 51 | 5.5 | — | — | 281 | 98 | 5.5 | 2 |
| 3 | 10.5 | 210 | 218 | 66 | 6.7 | — | — | 370 | 98.2 | 6.7 | 1.8 |
| 4 | 3.7 | 74 | 100 | 13 | — | — | — | 126 | 100 | 0 | 0 |
| 5 | 7.4 | 148 | 174 | 30 | 6.2 | — | — | 253 | 97.5 | 6.2 | 2.5 |
| 6 | 7.0 | 141 | 172 | 33 | 1 | — | — | 241 | 99.5 | 1 | 0.5 |
| 7 | 5.4 | 108 | 115 | 22 | 7 | 0.7 | — | 183 | 95.3 | 7.7 | 4.7 |
| 8 | 8.1 | 162 | 204 | 35 | 1 | — | — | 277 | 99.6 | 1 | 0.4 |
| 9 | 8.4 | 168 | 227 | 25 | 2.5 | — | — | 285 | 99.1 | 2.5 | 0.9 |
| 10 | 6.6 | 131 | 167 | 27 | 1.7 | — | — | 223 | 99.2 | 1.7 | 0.8 |
| 11 | 9.5 | 190 | 196 | 38.7 | 14.5 | 2.7 | — | 327 | 94.8 | 17.2 | 5.2 |
| 12 | 3.8 | 76 | 96 | 16 | 0.5 | — | — | 130 | 99.6 | 0.5 | 0.4 |
| 13 | 3.6 | 71 | 101 | 11 | 0.8 | — | — | 125 | 99.4 | 0.8 | 0.6 |
| 14 | 6.5 | 129 | 142 | 36 | 3 | — | — | 227 | 98.7 | 3 | 1.3 |
| 15 | 7.7 | 155 | 185 | 40 | 5 | — | — | 280 | 98.2 | 5 | 1.8 |
| 16 | 7.0 | 141 | 142 | 50 | 3 | — | — | 251 | 98.8 | 3 | 1.2 |
| 17 | 5.2 | 104 | 130 | 23 | 2 | — | — | 182 | 98.9 | 2 | 1.1 |
| 18 | 8.9 | 179 | 218 | 48 | — | 1 | — | 318 | 99.7 | 1 | 0.3 |
| 19 | 9.0 | 181 | 230 | 34 | 4 | — | — | 310 | 98.7 | 4 | 1.3 |
| 20 | 6.6 | 132 | 150 | 40 | 3 | — | — | 239 | 98.7 | 3 | 1.3 |
| Average | 7.0 | 142 | 167 | 34 | 3.3 | 0.2 | — | 246 | 98.5 | 3.5 | 1.5 |

*Zm*—Average daily conversation per connection.
*Z*—Total number of connections per group and day.
*T*—Total number of conversation-minutes per group and day.
*η*—Efficiency of sub exchange of smallest form.
*t*—"Busy" minutes of sub exchange per day.
*φ* —"Busy" in per cent of total conversation-minutes.

conversation-minutes per day in groups with ten connections, is fairly constant and is 16 per cent. Even the fact that some conversations last ten minutes or more has had

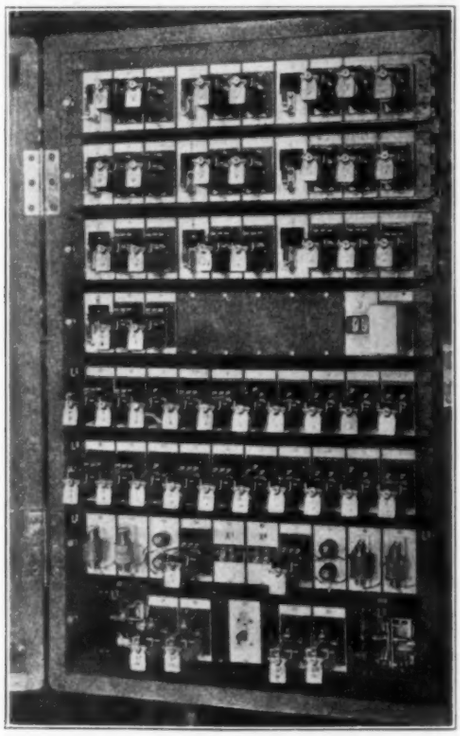

*Fig. 2. Sub-Exchanges of Smallest Type.*

no harmful influence on the efficiency, for there is not one case where two such long time connections coincided with each other. Where such coincidences do not occur, long conversations have no influence on the efficiency. The chronographic results in Table 2, No. 7 show such a condition, where there are several uninterrupted conversations of 15 to 20 minutes. In spite of that fact, we see the duration of simultaneous traffic of three or four connections together for the entire day to be not more than 7.7 minutes and in the individual cases not more than six minutes at the most.

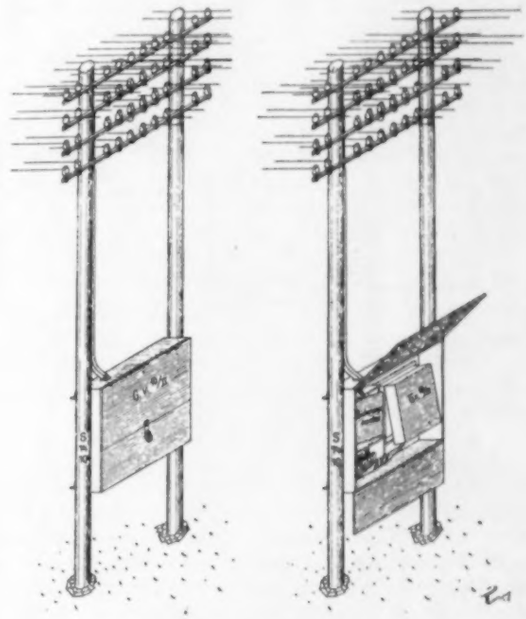

*Fig. 3. Wireless Brake for Railway Work.*

Nos. 6 and 7 had to be obtained to find out whether special technical devices were necessary in order to relieve the exchange from the intergroup connections made within these groups of ten. A temporary answer is obtained by comparing the local calls with the total number of connections made. The percentage of local calls is here 10 per cent. This shows that special technical equipment to relieve the telephone exchange for small groups of ten is not needed. This is especially true for those groups that lie within the local call section of the exchange. This is less evident where the so-called "silent exchanges" are used, as is the case in suburban traffic. Here there are from 20 to 40 or more subscribers per group and the distance between the various telephones and the silent exchange as also the main town exchange is often 15 to 20 km. As the ratio for such suburban or rural calls per day is 1, we would have some 40 connections per day. This would seem to speak for the separation of internal traffic from exchange traffic. But we have not considered as yet that we need not trouble about the total number of calls in these rural districts, but rather with the competition of internal group calls and long distance calls coming to the town exchange at any one time. This ratio is, however, very small, especially for rural service, and therefore necessitates no special technical installations.

To summarize the requirements of a rational small group system we have: (1) Formation of small groups of 10 to 40 connections in order to obtain as short a line of electrical conductors between the various members of the system as possible. (2) Selection of each two trunk lines per group to obtain the greatest efficiency

with greatest simplicity. (3) Transfer of traffic in groups of ten to the exchange trunk wires and reduction of the individual switching and connecting devices to a mini-

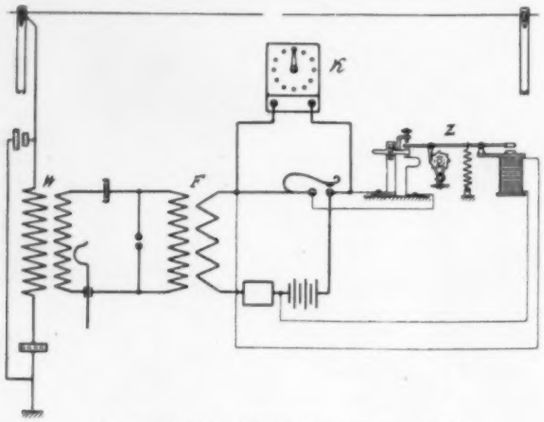

*Fig. 4. Wireless Brake for Railway Work.*

mum. (4) Separation of groups of 20 to 40 or more from the exchange trunks to special silent exchanges. (5) Use of storage batteries as local batteries at the group exchanges and permanent charging of the same during intervals between talks with current from the exchange. (6) Charging of the group switch batteries above ground, as return circuit in accordance with the three wire principle so as to relieve the exchange ground circuit. The operation of five to ten group switches connected with their negative poles to the exchange wire and the same number connected with their positive poles to the exchange wire seems to promise good results. The dimensions of the ground plates for the exchange charging current might have as maximum point a current density of 50 milliampere per sq. m. effective area. A ground plate of 3 feet height and breadth can absorb a continuous current of 100 milliamperes. (7) Protection of the relay windings from electrical corrosion by artificial elimination of the voltage difference of winding and core. This can be done by connecting the relay cores of the groups connected with their positive pole to the line, with the pole of the local battery.

We have various forms of device for the small group systems, which have been used in Bavaria since 1906. For longer traffic, especially for rural group systems, we have the "silent-exchange" shown in Fig. 1 for 20 to 40 subscribers. It consists of an iron frame on which are mounted the different relays, leaving room for more subscribers, and permitting the start with very few and increasing to the full capacity. The entire system is arranged so that in case of necessity the entire internal group traffic can later be removed from the nearest town exchange. The entire silent-exchange is placed either in the cellar or garret of a farmhouse or else in special corrugated iron houses provided with the necessary protective appliances. The telephones used by the subscribers have a special device which permits them to be informed by an acoustic signal, whether the desired line which was found busy is open for connections. This device is in form a small switch button on the side of the wall set, connecting with a direct current call bell, which will ring when the desired line is open.

For the erection of sub-exchanges of the smallest type, we have those for 10 to 20 connections, as is shown in Fig. 2. The exchange board is used for the connection of ten subscribers using two exchange trunk wires. The switchboard is very small, 2x2x1 feet, which makes it possible to install it anywhere, even between two double telephone poles, thus saving much expense for special installation material. The semi-automatic or automatic systems are the most valuable for this type of telephone operation, as they meet the special conditions in rural districts, that have so long deprived the farmer of the benefit of the telephone. As each subscriber selects his own line, he is independent of any operator and can get his call whenever he wishes. The mechanical construction of the selector switches is practically the same as that of other automatic systems, except that the rotating selector switch is much simpler and therefore less expensive. Practically, the small group system of the type described has found much favor in Bavaria, and has been to date introduced in 100 communities or more.—*Elektrotech. Zeitsch.*

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WIRELESS RAILWAY BRAKING.

Ever since the wireless telegraph and the telephone began to enter the field of railway traffic, attempts have been made to control mechanical movements of trains by electricity, without very much success until recent times. In 1911 the Wirth, Beck & Knauss laboratories experimented with the application of the wireless system to the prevention of railway accidents and seem to have worked out a system that meets the needs of traffic conditions. The apparatus is to work by setting the brakes automatically whenever the train reaches a block in which danger threatens it, and where it would not be possible to notify the train crew in time. The transmitting stations are at the stations or within the "blocks;" the receiving stations in the train, perhaps the baggage car. The sending station (Fig. 4) consists of a spark inductor *F*, with the wave transmitter *W*, the rotating

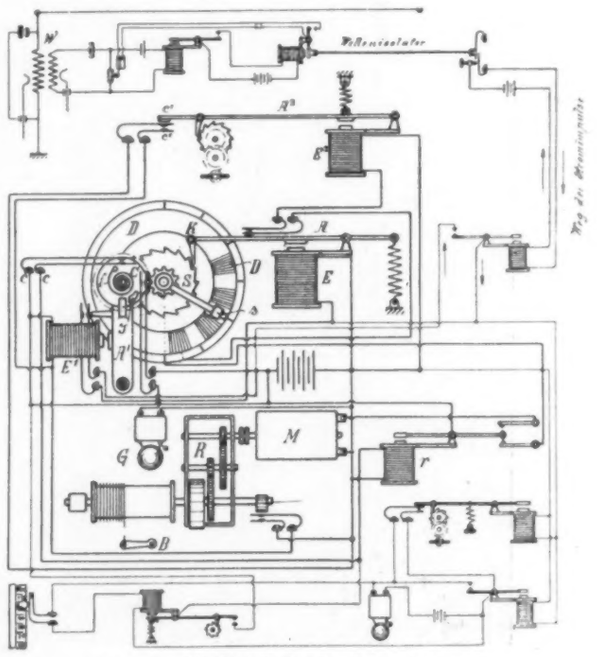

*Fig. 5. Wireless Brake Receiving Apparatus.*

switch *K* and the automatic signal apparatus *Z*. The receiving apparatus (Fig. 5) consists of the electric wave receiver *W*, the current distributing device with bell

signal $G$, the long distance braking mechanism $M$, $R$, $B$, and the release apparatus $E^2$, $A^2$. For transmission antennae, the railway telephone line is used; as receiving antennae, an antennae on the roof of the car.

When giving off a certain number of short signals by means of current impulses, sent from the transmission antennae, and caught by the receiving antennae, a signal is given in the train. Every current impulse atracts the armature $A$ of an electromagnet $E$, through whose movement a ratchet wheel $S$ with pawl $K$ is moved, depending on the number of impulses sent. Geared with the ratchet wheel is a contact $C$. This device is set so that after 16 signals from the transmitting station, the contact wheel moves an insulated block $J$ in such a way that a brake contact $c$-$c$ is closed. This again reacts on a relay $r$, so that the latter closes a contact to a motor $M$, which, through the operation of gear teeth $R$, operates the brake lever $B$. In doing this, an electro magnet $E^1$ is again excited and its armature $A^1$ with the attached contact wheel is attracted. This action releases the ratchet wheel, whereby the contact wheel with the insulated block is

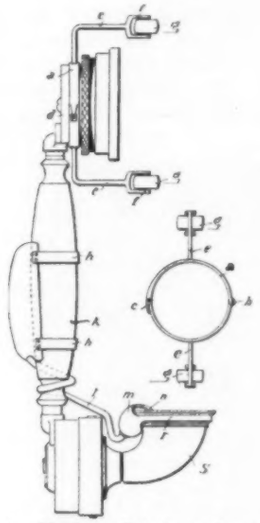

*Fig. 6. Hygienic Telephone Protector.*

returned to the original position by means of a spring $f$. The brake contacts $c$-$c$ are opened, the motor is disconnected from the current source, and the brake itself is set until the brake lever is again returned to the original position. Even before the brakes are set, the train crew is informed by both a bell and an electric light signal that something is wrong.

In order to protect the device against the influence of atmospheric disturbances, Wirth has used an appliance, which, after each current impulse with subsequent short stop, brings the contact wheel back to its original position. This return movement is obtained by means of a sliding indicator (Fig. 4$s$) which is attached to a wheel, and with each forward movement of the contact wheel, passes from an insulated field of a disc $D$, next to the contact wheel, to an electrical field, whereby again by means of an electromagnet $E^2$ and an armature $A^2$ a return movement contact $c$-$c$ is closed, and the return of the contact wheel thus accomplished. With very rapid transmission of the current impulses, the armature $A^2$, however, always returns to the rest position and prevents the return of the contact wheel.

In a two track system, it is necessary to tune the instruments for different wave lengths, so as to prevent the current impulses acting on trains other than those in the right direction, so that, in a given case, not all trains within the reach of the wireless wave impulses be stopped, but only those within a certain block, ground insulators are placed in those blocks within which the wireless is to work at any one time. These insulators prevent the low tension telephone currents from passing through the ground but allow the wireless waves to pass. In addition there is a warning instrument which gives a signal as soon as something in the sending or receiving station is out of order. A so-called automatic speedometer is also placed in every locomotive, and informs the engineer through a long drawn-out bell signal that he has exceeded the speed limit, and sets the brakes after an interval of 10 seconds. Practical and satisfactory tests have been made with this apparatus on the local railway between Nuremberg and Heroldsberg.—*Zeit. desVerein Deutscher Eisenbahnen.*

### HYGIENIC PROTECTOR FOR TELEPHONE INSTRUMENTS.

A Strassburg firm has placed a hygienic telephone protector on the market, which is shown in Fig. 6 and briefly described. The device is to protect the receiver and to disinfect the transmitter. The figure shows the attachment for a connected receiver and transmitter, as used in German practice. To the receiver a small frame is attached, with two rollers over which paper rolls are passed. Ring $a$ can be opened by means of a hinge $b$, and locked by a lock $c$. The entire ring is placed around the receiver $d$. On the ring $a$ are the bent arms $e$, which carry paper rollers $g$ between supports $f$. These supports with the rollers and paper rolls fit against the head. Over each roller is a sheet of tissue paper, which can be rolled and torn off easily, so that each user can tear off the old sheet and pull on the new one. The transmitter $k$ is provided with a rubber ball $i$, which is connected by means of tube $l$ with a casing $m$. In this case is the disinfecting material which is usually a piece of absorbent cotton, soaked in the disinfectant. The case $m$ has openings $n$, which lead out to the transmitter mouthpiece $s$, so that a current of air made by the rubber ball is blown into the mouthpiece. When expanding, the ball draws up the air through the disinfectant, and blows the same air again through the disinfectant when the ball is pressed, so that the air is twice placed in contact with the disinfecting material and thus serves its purpose well. The case $l$ is attached to the mouthpiece $s$ by means of band $r$, which is done for the rubber ball $i$ by means of $h$. The entire apparatus is rather interesting as an attempt at useless effort, for the danger incidental to the use of the telephone is so slight, from the standpoint of a disease carrier, that there will be very few who will care to invest in such a device, which is, no doubt, fairly expensive. It is also the question whether any one using the telephone will be interested enough in his health to take the trouble of tearing off a sheet and rolling on another one on the receiver, and to press the rubber ball to disinfect the mouthpiece.—*Elektrotech. Zeit.*

### TELEPHONE SERVICE IN RUSSIA.

Telephone service in Russia as in most European countries is a privilege of the state. Operation is, however, not entirely in the hands of the state, but is carried on in many cases by private companies under the supervision of the state. Up to 1886 all the telephone lines were in the hands of private companies under state grants, and in 1888 the first state-owned and operated lines were built. At the end of the year 1908 there were 99 state and 58 private long distance districts, and some

69 telephone districts under the operation of smaller or larger communities. In 1913 outside of 153 state-owned and operated telephone lines, there were 114 private lines with concessions from the state. A concession is only given for 18 years. At the end of that time the whole line passes over into the hands of the state, often without any financial payment by the latter. The companies running the service have to give a certain definite amount to the state each year. The state-operated telegraph department has also the privilege of fixing rates, often of fixing a certain maximum rate. In 158 smaller communities, telephone lines are operated by smaller companies, guilds and communities, not supervised by the state, but concessioned by it. In Finland telephone service is on the whole in the hands of various trades and corporations. In smaller communities the various subscribers have to pay for the installation costs and costs of instruments and upkeep. In larger towns corporations pay these expenses and charge an ordinary toll rate, as is done everywhere else. The larger telephone districts of Russia, namely Odessa with 6,842 subscribers, Riga with 8,876 subscribers, Warsaw with 28,935, Moscow with 433,348, and Petrograd with 46,842, are operated by private companies under grant from the state. All these lines are on the two-wire principle, but have all overhead transmission. In the smaller places, even those with 872 subscribers, single wire service is used. Cables in underground conduits seem to be unknown to private corporations. The state has placed a few kilometers of cables in Kiew with 4,635 subscribers, and Lodz with 4,103 subscribers, but all the rest are overhead lines. Several districts with more than 1,200 subscribers are still on the one-wire principle. According to Russian statistics, the service in 1913 was for 167 million inhabitants 417,700 telephones, which gives one instrument for every 526 inhabitants. In European Russia the ratio is one telephone for every 526 inhabitants; in Asiatic Russia, one for every 1,494, and in Finland, one for every 88 inhabitants. Telephone service between various towns and districts is very primitive; in other words, long distance traffic is almost dead. It is only in European Russia nearer to the other countries that we have any sort of long distance service, and then it is under direct supervision of the government. Nearly all lines up to 200 km. length are in iron or steel wire form; the iron telegraph wires are used for telephone work. Aluminum wire is also used to a slight extent. There is no unit rate for telephone service, as distances and traffic conditions are too varied. Up to a short time ago Russia was practically isolated as regards telephone connection with neighboring states. The first German-Russian telephone line Libau-Memel was opened only a short time ago. The line is 100 km. long with 23 km. on German soil and uses 4 mm. hard copper and bronze wire.

### ELECTRIC CONDUCTORS OF ALUMINUM.

The consumption of aluminum for electric conductors is increasing each year and is now estimated at 10,000 tons per year, with a probable increase for the next few years of 50 per cent. If the impurities do not pass 0.75 per cent it is said that aluminum can be used anywhere along the seashores where copper can be used. Aluminum must not be used where chlorine vapors are emitted, nor can it be used where alkaline solutions are used. Near coke ovens aluminum wire gives better service than copper, as it is not attacked by sulphur vapors. The mechanical qualities are summarized in the table. The material is cold rolled which increases the strength by 10 per cent. The elastic limit lies near 70 per cent of the tensile strength. In the case of an alternating current cable with paper insulation for low tension current, and a copper cross section of 64.5 sq. mm., equivalent to 107 sq. mm. aluminum wire, with lead cable cover, aluminum is cheaper, provided its price does not

| Diameter of wire in mm. | Tensile Str. lbs. sq. in. | Elongation in 13 cm. lengths |
|---|---|---|
| 5.89 (0.235 in.) | 24708.0 | 3 % |
| 4.88 (0.1852 in.) | 26980 | 3 |
| 4.06 (0.1624 in.) | 29820 | 3 |
| 3.25 (0.1300 in.) | 30530 | 3 |
| 2.64 (0.1056 in.) | 31382 | 2.5 |
| 2.03 (0.0812 in.) | 32518 | 2.5 |
| 1.63 (0.0652 in.) | 33086 | 2.5 |

Bending test: Three times around diameter back and forth.

rise beyond $11 per 220 pounds above the price of copper. With simple lead cables aluminum can be only $5 more expensive than copper. With reinforced two-wire cables, aluminum must be even cheaper than copper to compete with it.

### THE TELEPHONE FIELD SERVICE.

One of the most important uses of the telephone for extraordinary purposes is its use in war, and in this direction it far surpasses the service of the older telegraph. The requirements made on the telephone system are very high, however, and so it has taken years of painstaking labor to bring the telephone to a degree of perfection where it can do good work. The first attempts at using the telephone for field work were made as far back as 1882, when the English army used it in the Egyptian campaign. The principle used was that of interrupted signal contacts, a forerunner of the buzzer operation. During the Russo-Japanese war the telephone was used much more extensively, and it was then that studies and observation could be made on its usefulness. The results were so encouraging that all countries introduced the telephone as part of their military equipment. During the last Balkan war the telephone showed its excellent efficiency, in many instances superior to the telegraph. In this present war the telephone is again used to a greater extent than ever. The immense stretch of battle line makes it absolutely necessary that communication between the various parts of the army be instantaneous and in a form more convenient than conversation by Morse code. The present service in the German-Austrian armies is installed by the telegraph and telephone engineering corps, an outgrowth of the pioneering battalions. It is their duty to erect or destroy lines, as the case may be, and to watch over the efficiency of the service. In this war even the various infantry columns are equipped with telephone sets and a certain quantity of wire material. Arrangements have been made so that telegraph lines can be used for telephone service without interfering with the telegraph service. The various reconnoitering parties, whether infantry or cavalry, are provided with portable instruments and wire. For field train service the telephone is used exclusively for guarding the railway service and train dispatching. The field artillery uses the telephone for communication between the various batteries and between the batteries and the observation station, which is often far distant from the guns and from there the effect of the shells and the sighting and correction of sighting are controlled. In the aerial corps, the crew of the stationary balloons are in constant telephonic communication with the troops down below on the ground. All this shows what an important factor the telephone has become for the present military organization.—*Zeit. f. Post u. Telegr.*

# Operators' Efficiency Campaign in Kentucky

*What Some of the Ambitious Girls in the Independent South Are Doing*

## An Efficiency Campaign in Kentucky

By B. Y. Chambers, Assistant Superintendent, Louisville.

THE efficiency campaign which we have on down here in Kentucky contemplates one hundred per cent results in all departments and branches in the telephone field. We were very much encouraged by the results obtained during previous years, but we had no idea that there was as much latent enthusiasm bottled up in our organization as we have been able to uncork during this year of 1914. One hundred per cent collections, the increasing of the subscription list without additional cost, the striving of our operating forces to outdo each other in the matter of furnishing service are no longer novelties in this community. They are accomplished facts which we have with us and we are very proud indeed of the people who have enabled us to bring about these conditions. A photograph taken at our meeting at Frankfort, Ky., a few days ago accompanies this letter.

Our operating forces all over the system are thoroughly organized, that is, we hold employes' meetings at each plant periodically, and in addition to this, quarterly we hold district meetings and annually we bring our chief operators and as many toll operators as is practicable from each plant into our headquarters at Louisville. In holding the individual or exchange meetings the chief operator always takes the chair and papers, which are prepared by the operators themselves, are read, commented upon and discussed by the operators, by the manager and by visitors, if they have any. A district meeting was held at the office of the Frankfort Home Telephone & Telegraph Company at Frankfort, Ky., and it was one of the most enthusiastic and successful meetings that we have ever had. Besides representatives from our own exchanges at Louisville, Maysville, Frankfort, Carlisle, Cynthiana and Lawrenceburg we had several representatives from connecting companies at Lexington, Versailles and Shelbyville. The visitors were all requested to get to Frankfort early in the day and they were taken around the town and shown the sights, including the new Capitol building, and the meeting was called to order by the chief operator of the Frankfort exchange at 7:30 in the evening. The district meetings are held at some convenient place in each district and papers are prepared in the same manner, with the local chief operator presiding. The idea in holding these district meetings is to alternate around the district in such a way that all of the operating forces may at some time or other have the benefit of attending a district meeting.

*Operators for the Central Home Telephone and Telegraph Company, Louisville; the Fayette Home Telephone Company; the Maysville Home Telephone Company; the Frankfort Home Telephone Company; the Paris Home Telephone and Telegraph Company; the Cynthiana Telephone Company; the Lawrenceburg Home Telephone Exchange; the Nicholas Home Telephone Company, and Other Independent Exchanges, in Quarterly Meeting at Frankfort, Ky., October 24.*

On Saturday, October 24, many excellent papers were read and discussed, and after a most instructive and enjoyable meeting, refreshments were served in a large banquet hall and everybody seemed to enjoy themselves very much as well as being very outspoken in regard to the general success of the meeting.

## Qualifications of an Operator

By Miss Daisy Florence, Chief Operator, Cynthiana.

THE qualifications to become a good operator are many. She should be bright, intelligent, having good health, hearing and eyesight, also being possessor of a good disposition. The operator having a good disposition is always courteous and obliging. Being healthy, you can depend on her to be at work instead of calling the chief operator a few minutes before or after time to report for duty, saying she is sick and unable to come to work today.

A young woman of seventeen or eighteen years of age will make the best operator, as she is more apt at learning the work, quicker in action and more readily conforms with the rules governing her work. Being well instructed in the beginning, she knows just what is expected of her, always bearing in mind that she is a representative of the company. She is only a cog in the great wheel of industry run for the convenience of the people.

It is not possible, however, to govern her acts by rule; much must be left to her own judgment. Being held responsible for the exercising of these qualities as well as the observance of rules will not accomplish the desired results; it is the spirit and manner in which they are performed—giving her whole time to her work, while on duty, answering all calls in a manner which shows the patrons how willing she is to serve them.

On being spoken harshly to by a patron, don't answer back, but control yourself. You always win. Explain the cause of the trouble or delay in a pleasant way and you will find they will speak different in the future. Perhaps the subscriber has good reasons for being cross. If he has been waiting at the telephone for an answer or has been disconnected in a very important business transaction, put yourself in his place. Would you be pleasant?

Co-operation between employes wherever located with respect to each other is essential for the proper handling of the service. The most effective co-operation which an employe can give to another is proper performance of her own work. The work will be good or bad according to the speed and precision of the team work between the employes concerned. Co-operation among employes, in any business, is essential to the success of that business, but in the telephone business it is more than that. It is of paramount importance.

## How Toll Operator Should Handle Public

By Miss Pemberton, Toll Operator, Shelbyville.

TO BEGIN with, I wish to thank the officials of the Central Home Telephone & Telegraph Company for this opportunity of meeting with the other operators of the district and becoming better acquainted with them and their methods of operating as well as how they handle the public so as to get the best results.

The subject "How a Toll Operator Should Handle the Public in Order to Get the Best Results" having been assigned me, I will say I find in the telephone public many different kinds of characters. Some will help you all they can to get their calls in correctly and are ready to give you any additional information that may be necessary in order for you to locate the party wanted; while others will simply tell you they want John Jones, in Louisville, and leave it to you to drag any other information out that you may need and think they are doing you a favor by dishing it out as you may require it. It is this latter class of subscribers that try our patience most and it is here we should keep an even temper. I find, in dealing with people of this class, it is necessary to get all the information we can before putting this call through, for often after chasing the party called for all over town, he will tell you any of the family will do.

Once in a while I have a call like this: "I want John Smith at the corner drug store in Louisville." I will call Mr. Smith, completing the connection, and hear something like this: "Will you please run over next door and tell Mary Jones I wish to speak with her?" Then I am in the midst of a bad affair, for this means I must take down the connection, explain the matter to Mr. Smith and have him send for Miss Jones, and after completing their conversation I must charge my party with two messages and let the manager or collector get the money without offending the subscriber, if they can, where if I had only asked him if he wanted to talk to Mr. Smith himself or would anyone else do, my party would have told me it was Mary Jones that was wanted. The collector's time would have been saved in looking up the ticket on this extra call, ten or fifteen minutes' use of the toll line, and would have had the subscriber's good will.

I find that we cannot get too much information on a ticket, both for our benefit and that of the bookkeeper and collector after the ticket leaves our hands.

Knowing full well before we take our positions as toll operators that we will have many different kinds of people to deal with, we should make up our minds to maintain an even temper and deal absolutely fair with the public and also the company we work for.

We are, after all, selling service and if we let our own likes or dislikes cause us to lose a sale or several sales, we have fallen short of our duty to our company.

## Proper Handling of Toll Tickets

By Miss Murphy, Chief Operator, Maysville.

THE greatest product that any telephone company has to sell is its long distance service. The full effectiveness of the sale of this long distance service must necessarily depend on the efficiency of the toll operators, because the completion of each and every message rests entirely on the efforts they may make to locate the parties with whom connection is desired and the establishing of the connection.

Speed, accuracy, co-operation and courtesy are the fundamentals for efficient toll operating and this is best accomplished through the "Proper Handling of Toll Tickets."

An operator cannot be too careful with her toll ticket, which should be complete in every detail, for it is on this small piece of paper that she must record the entire transaction between the patron and the company and it is from this small piece of paper that the toll clerk must do her posting. Records show that a very large percentage of "toll errors" are caused by the carelessness exercised by the toll operator in her failure to supply the full information called for on the ticket. This means trouble for the accounting department, for no matter how proficient the toll clerk may be she cannot always fill in the information or correct the errors that were made by the operator and the ticket is filed uncollectible.

An error of this kind means a waste of circuit for some other exchange, a loss of valuable time for the operator, an error for the toll clerk, a dispute for the collector, a rebate for the subscriber, and explanation for the cashier and a financial loss in money for the telephone company, all of which could have been easily eliminated if the operator had properly handled the ticket at the time it was recorded.

Having defined the importance of the "toll ticket," we will now handle a call through its entire course from the time it is given until it is completed: The operator upon receiving a call should first secure the full name and correct telephone number of the party calling. She should then find out the full name and telephone number and address of the party called. Especial care should be exercised in ascertaining this information, and if there is any doubt as to the spelling or telephone number the operator should in all cases verify them by repeating the call to the calling party.

If the call was for a firm or a particular person, the operator should inquire if the calling party would be willing to talk to some one else in case the party originally called for happened to be out. All this should be carefully noted on the toll ticket. This information having been secured and noted, the operator will now find out as to whether the ticket is to be sent "Paid" or "Collect" and if the messenger, if necessary, would be OK.

If the calling party should happen to be a non-

subscriber and should desire the message to be charged, the operator must have the collection of the charges vouched for by the subscriber who pays the rental bill on the telephone. The matter of having the non-subscribers' calls OK'ed is a very important matter and unless properly handled, and correct notations made on the face of the ticket, will result, in time, in an argument for all parties concerned and in many cases the charges for the message are never collected.

After the operator has this information properly recorded she should enter her working number, the filing time and serial number. To enter the serial she should refer to her serial report and the last unused serial should be selected and checked and this number placed on the ticket, which is now ready to be passed to the other exchange.

The first step in this part of the work is to select the proper circuit for handling this call. This done, the operator should listen on the line to see that it is not in use. If the circuit is not busy she proceeds to signal the other exchange by giving a ring of two seconds' duration and this is to be repeated at intervals of every twenty seconds until she receives a response to her ring. When the distant operator responds to her ring she should proceed to pass the call, using as few unnecessary words as possible, and unless there is some good reason, the parties should immediately be connected and the conversation actually started. The operator should then enter the connection time on her ticket and this should be watched closely until the conversation is finished, when the operator should record the time of disconnection. Following this she should relieve the circuit by giving one very short ring. The ticket should now be completed by entering the total minutes used, the initial and overtime charges and messenger charges, if any, and these amounts should be carefully added and the total amount should be plainly written in the total column of the ticket. The operator finishing the ticket signs her number in the space provided for that purpose and the ticket is complete to be filed with the business of the day.

It does not follow that all long distance calls have as smooth sailing as the one we have just handled. It may happen that the person called for may or may not have a telephone; that the party may or may not be at the telephone; that it may be necessary to send a messenger or make an appointment; that the line called for may already be in use or that numerous other things may prevent a ticket from being immediately completed. Yet, with all these possible obstacles to be met, an operator can promptly and efficiently dispose of her ticket, if she has fully recorded the information that she gathered at the time the call was given to her. With the information before her, she should know just what to do without having to call back the calling party to ply him with additional questions, which is annoying and disgusting, and which oftentimes leads to cancellation.

Frequent reports are necessary on all delayed calls. The operators must know the code and its meaning must be uniform with all. All long distance information must be handled through the use of the code and unnecessary conversation must not be indulged in. Especial attention should be given to all D-A tickets and when possible a better explanation should be ascertained for the calling office.

Any ticket that is not completed by midnight of the day upon which the ticket is filed should be considered as lost for that day. These tickets should be examined the next morning and if possible they should be revived and completed. The original, unfinished ticket should be left in its place in the file and notation made on the back showing date and time it was revived. The completed ticket, however, shall appear as a new ticket for the day on which it was accepted.

All operators shall co-operate and render all the assistance possible to the distant office, for she never knows at what moment the success of her own efforts may depend on the help of some other office.

If the spirit of this paper is encouraged the percentage of lost tickets will be greatly reduced, which will mean a greater earning, greater revenue, better toll traffic, and the proper handling of toll tickets will have been worth the while.

## How I Get One Hundred Per Cent Results

By Miss Ona Hieatt, Chief Operator and Collector, Lawrenceburg.

I THINK it is a wise and helpful plan for us to attend a meeting like this where we can talk "shop" and listen to the experiences of others and compare our methods of work; for by the interchange of thought we get practical ideas which help us to reason out ways of our own for surmounting obstacles and overcoming difficulties in our business. Do not infer from my subject that I always reach the highest degree of efficiency in my work, or that I have found a royal road to attaining one hundred per cent results in the combined position of collector and chief operator. There are problems that we have to live through and rise above as we "peg away" at the job of trying to please and serve.

I find that in the matter of collecting the principal attributes must be promptness, patience and persistency. Some patrons pay promptly, others seem to be thoroughly saturated with the old maxim that "Talk is cheap" and, therefore, telephone bills are unimportant. The old adage that "They who dance must pay the piper" finds a literal interpretation in "They who talk must pay the operator." To those in arrears I make frequent visits and let them know I will call at regular intervals with my bills, and finally, like the judge in sacred history who granted the unfortunate woman's request, they pay me "Lest I weary them." A bill sent through the mail will bring a prompt remittance from some patrons, but it is the persistent appeals to others which enable us to attain one hundred per cent results in collecting.

As chief operator, I try to discharge my duties conscientiously and in a satisfactory manner to my employer. Thackeray said, "My good friends, it is not only impossible to please you all, but it is absurd to try," but Thackeray lived before the days of the telephone. Of course it *is* impossible to please everybody, but I don't believe any class of people *try* harder to please than the "Hello" girls.

I aim to employ girls who are tractable and will render prompt and efficient service; and at the switchboard I try to set an example worthy of their emulation. Also, as chief operator, I try to have things move in the office with regularity and order. I have found in the business world the best principle is method and scrupulous exactness.

While we are getting our experiences as operators and collectors we probably make mistakes, but I feel

it was a wise philosopher who said, "Use our mistakes as stepping-stones on which to rise to greater things." So let us surmount all obstacles and try to attain one hundred per cent results in our work, thereby pleasing an exacting public and winning from our employers the coveted "Well done, thou good and faithful servant."

## Duties of a Chief Operator

By Miss Jessie Wilmot, Chief Operator, Frankfort.

THE subject assigned me for this evening, "Duties of a Chief Operator," is one of which I am sure every chief operator well knows and one on which I feel I cannot tell you anything with which you are not already familiar.

First, I think a chief operator should be thoroughly interested in her work and feel that it is just as much to her interest as to the company's to have the service well spoken of. She should familiarize herself with the rules and regulations pertaining to operating and as nearly as possible have them carried out, but her proper position cannot be attained by rules and regulations only. She should gain the respect and confidence of her operators in order that these rules be obeyed without the slightest friction with the general working of her department. In order to obtain this she must to a certain extent establish between the operators a common interest and general enthusiasm in their work, which will make them rise above their individual selves and feel that it is their co-operative efforts that are going to produce results.

During my experience as a chief operator I have fully realized the importance of carrying out this point, and, since our recent organization of regular operators' meetings, how much better is our opportunity to discuss and explain these things. I think the operators in meeting and discussing the various points in their work have begun more fully to realize the importance of their united efforts in order to please the public and give the service which is expected of them.

Dear Miss Jessie—All of us wish to express to you our opinion as to the good we think the operators' meetings are doing for us. When you first began to talk to us of these meetings we all agreed in thinking they would be very foolish and a waste of time, but after our first meeting we began to see the benefit we might derive from them if we would only take the proper amount of interest, and we assure you this is just what we expect to do.

At our first meeting, as no doubt you will remember, we discussed the different kinds of complaints we received from subscribers and we found ringing on busy lines was reported more than any kind of trouble, which we all know is caused through carelessness. Since this discussion we have all agreed to watch this one fault very closely and report to you each time we make a mistake of this kind, and you know how few these reports have been the past month.

Another thing we have learned is the trouble which might be caused from not handling our cords in the proper manner. One of the first things taught us in operating is proper handling of cords, but not until this had been thoroughly discussed and demonstrated by our wire chief, in one of our meetings, did we fully realize the importance of this, and now we are all striving to see how little cord trouble we will have in the future.

We operators have one aim in view and that is for the Frankfort Home Telephone & Telegraph Company to be noted for its efficient service.—Loyally, *The Operators.*

## Swift Handling of Toll Calls

By Miss Myrtle Delana, Toll Operator, Frankfort.

IT IS my opinion that swift handling of long distance calls is a very important feature in telephone work, and I find from experience that all information concerning calls should be obtained from the subscriber when he first gives in his call. For instance, if Mr. Smith wants to talk to Sam Jones, telephone 101, Louisville, you should ask him if he will talk to someone else if Mr. Jones is not in, or leave word for him to call when he comes, for unless you do this you will have to ring back your subscriber and tell him Mr. Jones is out, and perhaps he will say, "I will talk to Mr. Black in the same office." If you had asked him in the beginning you would have prevented this delay.

Another point I wish to bring out is prompt reports on calls. When a subscriber gives you a call, do not wait until he calls and asks "What about my party?"—and then have him wait on the line until you get a report; that is not good service. Good service is to get him a definite report and give it to him promptly and when he sees you are attending strictly to business he will be more patient. It takes prompt service and good judgment to build up toll business.

Another way to make long distance better, as was discussed in one of our meetings, is co-operation of different station operators. When an operator is cross, when you ring her to pass her a ticket or ask her for a report on a call, just talk to her in a very soft and pleasant tone of voice and she will soon become the same way. If all operators will do this I am sure it will help long distance service very much, for you cannot give the right kind of service when one operator tries her best and the other kind does not care. The way is to work together and it will bring results to the Home telephone companies as well as to the operators.

## Voice Culture—Its Effect On Operating

By Miss C. Lusby, Chief Operator, Paris.

VOICE culture will be one of the important studies of our future school of operating, and those of us who are trying to put into effect what we already know will have the advantage of those who must acquire it before being considered capable of holding the position of operator.

Successful operating is fast developing into a science—doing certain things you get certain results. I know from personal experience that the results gained from this decision, namely, to make my patrons know through the tone of my voice that we are interested in their every call, that we are there expecting to assist them in every possible way, that we enjoy our work, that the more business they do over the home telephone the better pleased we are—has repaid me many times for the time spent in seeking the best way in which this could be done.

We have no way in which to assure the public of our interest and desire to please except through the voice, and it must be trained to carry a sense of cheerfulness and interested attention that a personal interview would give under favorable circumstances.

We must feel the things we want to express; then there will be just a reflection of our real selves instead of revealing a disinterested servant.

In my tests I have found that a low tone of voice (each word spoken directly into the transmitter) is more easily understood and does not interfere with the operator near you. The next time you cannot make a station or subscriber hear, inhale deeply, drop your voice from the top of your throat to the chest, speak low, distinctly, and into the transmitter, then see if you are not understood in less time. If so, try it again and again, until you are satisfied that it is the best way, then adopt the habit of always using the best method.

Let your voice express sympathy where there seems to be need of it. We have subscribers, and so has every other exchange, who look upon their telephones and "central office" girls as a source of sympathy and consolation in time of grief and sorrow and protection in time of danger, and after we have been operators long enough to know this, how easy it is to deal with them in the sympathizing mood instead of the opposite.

During a lingering illness, which resulted in death in the family of one of my patrons, I was frequently greeted with, "Oh, Central, I am so glad you are back again. You do not know the comfort you have been to me; you are always so kind, and you seem to understand. I wish you would always answer me." Again, taking a patron's voice as expressing his present state of mind, let us sometime dispel the gloom by such a kind and happy tone that he forgets, as this remark taught me: "Say, we've got a new central down to the office, and it's the funniest thing I ever saw; I go to the telephone at times cross and impatient, and the minute she answers me I forget it all and find myself really happy. I can't explain it, but she is my kind of central all right."

We will not always know the good we do, but we can always know the effort we make is never lost though it oftentimes seems to go unappreciated.

During the time I spent as an operator I was so enthusiastic over the idea of turning all the cross people into kind and pleasant ones that I asked permission to handle their calls whenever possible in preference to those already kind and considerate. The motive was a selfish one in a way because I derived so much pleasure from the change that always came in return for my efforts—a gentler tone of voice, a "Thank you, Central," more patience, words of commendation and praise to the chief operator and manager making for harmony in all departments of our work, and last but not least, patrons paying their bills with a smile. That is what the Louisville office wants—the bills, and they prefer them with a smile.

## Effect of Operating On Collections

By Miss Esther Wilmot, Ticket Clerk, Frankfort.

DID any of you ever stop to consider how closely each department of the telephone company is related and how each one is dependent upon the other in carrying out the general working of the plant?

The general impression of the public is that our aim, or in fact, the aim of any large corporation, is making money and promoting its own interest, and to some extent this is true, but in order to do this and make our company a success we have to do everything in our power to please the public, whom we know is always ready to criticise and find fault with the least mistake we should happen to make.

The secret of a successful telephone company lies in its operators and in the manner in which they deal with subscribers. It is very embarrassing to a collector when she presents a bill to have the subscriber say that the service has been very poor, and he does not feel like paying for something which he did not receive; while on the other hand, it is quite encouraging to have them say, "My telephone bill is one that I do not mind paying; I certainly do derive great benefit from it and I have nothing to say against your service."

The toll operator can to a great extent aid the collector in her work and prevent lots of trouble by being accurate with her toll tickets. Such mistakes as a failure to stamp a call "Reversed" when it should be, or the wrong telephone number, causes the collector no little trouble. This makes the charge on the ledger wrong, and perhaps we have to rebate such calls on account of not being able to find out just exactly how the mistake did occur, while if, when the call is being made she would write everything necessary and not depend on her memory, it would prevent this and the call would be paid without any dispute whatever.

During one year's experience as collector for the Frankfort Home Telephone Company such complaints as these were few, and as a general rule the subscribers spoke well of our service, and especially did I find this true among our business men.

## Conduct of Operators Off and On Duty

By Miss Rose Collins, Chief Operator, Nicholasville.

NOT only does the success of the telephone company depend on the conduct of its employes, but the success of the employes themselves depends on their own conduct, and especially is this true of operators.

When the company finds that an operator is not efficient and will not do her duty, it immediately begins looking for someone who can and will do the work as it should be done. Now, the question arises, "What has the conduct of the operator, while on or off duty, to do in the manner in which she does her work?" I would answer it has all to do with it.

The telephone operator, although she cannot see or be seen, comes in contact with more people, each with a different disposition, than any employe of any other concern. Consequently she is in a position to make a good impression for herself and give satisfaction as a representative of the company. But if she does not guard her conduct, conditions will be just the reverse.

When we insert a cord preparatory to answering a subscriber, we do not know why they are calling. It may be just to have a social chat with some one or give an order to some one of the merchants, or it may be a call for a physician, or it may be that a death has occurred. Then, how different will be the opinion of the calling party if he is met with a pleasant "Number, please," or if instead they hear the same or some other expression repeated in a cross and impolite manner.

Now, I shall give what to my mind should be the conduct of operators while on or off duty.

They should conduct themselves in a courteous

and business-like manner and should be lady-like at all times and under all circumstances; and while they should be quiet they may be jolly and pleasant, but never loud or boisterous.

People on the street and in the stores—in fact everyone with whom we come in contact—are apt to judge our ability to perform our work by our appearance and the way we act while on or off duty.

Operators should feel that the chief operator is their best friend, and therefore should try at all times to do just as they know she would have them do, whether she is present or not. An ideal operating force, according to my opinion, is one where the operators are in harmony with each other and where each one does her work with a willing mind, not because she is paid to do so much, but because she is paid to look after the interests of the company while on duty and should perform her work as though she was the main factor and success depended entirely upon her efforts. The rules of the company should be observed without question.

## How to Increase the Toll Business

By Miss Ona Harrison, Chief Operator, Louisville.

EVERY operator should be made realize the importance of the service she is furnishing to her company on the one hand and to the subscriber on the other. For the company she should do her very best work each day. It is impossible for each operator to have her own way, but many times her suggestions are good. To make them satisfactory to our system, it must be clearly shown that it will improve operating conditions and bring an added revenue to the company.

As to the subscribers, she should make them feel that she is interested in them by being courteous and keeping them advised on calls. Definite reports are usually satisfactory to the subscriber and it gives the operator more time for the other tickets.

By rendering such service, the company not only gets a part of the toll business, but practically all of it.

The subscribers always remember the good service, and they especially remember the bad. That is what we should strive to cause them to forget by being courteous and showing them that we want and appreciate their business. This can also be increased by completing every ticket possible each day and by trying to revive the lost ones the following day. During September we revived 291 tickets. Toll work has been very interesting to me because it shows us what we are doing. It is interesting to see each month how our revenue has increased over the previous month. It should be the desire of every operator to be worthy of her position and to move upward to higher and greater positions.

## Pioneers Hold Convention at Richmond

With four hundred members present, the annual convention of the Telephone Pioneers of America opened October 29, in the auditorium of the Jefferson hotel, Richmond, Va. Immediately after the association had been welcomed the election of officers was taken up and, with but one exception, the officers were reinstalled.

Although the meeting that morning was called a business session, it was little more than a gathering of old friends, whose happy laughter rang across the room as they shouted greetings back and forth. The meetings each year are called conventions and many important papers are read and discussed.

The officers chosen were: Theodore N. Vail, president; Thomas D. Lockwood, Angus S. Hibbard, Thomas B. Doolittle, Georgie E. McFarland, vice-presidents; Henry W. Pope, secretary, and George D. Milne, treasurer. The executive committee is made up of Charles G. DuBois, Edgar F. Sherwood, James Robb, Charles E. Scribner and James T. Moran. Mr. Vail was not present when the convention opened, having been detained at Old Point.

The convention was called to order by Vice-President Thomas D. Lockwood, who presented J. W. Crews, local superintendent of the Chesapeake and Potomac Telephone Company, who, in turn, introduced Mayor George Ainslie.

The city's chief executive welcomed the visitors to Richmond and Virginia. Vice-President Lockwood made a brief response and the meeting proceeded with the business of the day.

Dr. Alexander Graham Bell, inventor of the telephone, who was scheduled to attend the convention, was unable to come.

N. T. Guernsey, general counsel for the American Telegraph and Telephone Company, New York, addressed the meeting on "The Relation of the American Telegraph and Telephone Company and Associated Companies;" Angus S. Hibbard, of Chicago, spoke on "The Blue Bell and Its Origin," and James Edward McCulloh, general commercial manager of the New York Telephone Company, talked on "The Telephone as First Applied to the Operation and Dispatching of Railway Trains."

The annual banquet was served in the dining room of the Jefferson hotel. No pains were spared to give the pioneers the best the city could provide. Several noted speakers talked to the pioneers afterward.

The Telephone Pioneers of America is composed of men who have been in service twenty years or more, and has a membership of about 1,000.

The afternoon and evening meetings brought the business sessions to an end. The members, after the convention, went down the river to Old Point. The steamer Smithfield was chartered for the trip. After stopping at Jamestown island, it arrived at Old Point in time for a special dinner which had been arranged at the Chamberlain hotel. Saturday the visitors took sightseeing trips to Washington and around Virginia.

## Bamboo Telephone Poles in the Philippines

The Chicago Jovian League was enteretained October 5 by John A. Kick, who gave an interesting talk on his experiences in the Philippine Islands. Mr. Kick spoke on the extensive employment of bamboo for structural purposes, especially for supporting telephone wires. These bamboo poles are climbed with the assistance of bamboo ladders. The elasticity of the poles is so great that by the time the lineman has reached the top, the pole is bent nearly to the ground. The bamboo is exceedingly hard and it is impossible to use spurs. The natives climb with their bare legs, but American linemen are forced to use ladders. Although the native hard woods are hardly penetrable, they are not proof against the ravages of ants which infest the tropics. Mr. Kick cited one instance where a large pole was found to be absolutely hollow, ants having eaten away the entire interior.

# Investigation of Inductive Interference

*California Joint Committee Report as Presented Before the A. I. E. E.—Continued from November*

APPENDIX III—TRANSPOSITIONS.

THE sources of the disturbances in communication circuits, which arise from parallel power circuits, have been treated in the first section of the preceding appendix. The effect of transpositions on the induction in communication circuits produced by parallel power circuits will now be considered.

This appendix comprises the four following sections:

1. Effect of Transpositions in Reducing Induction.
2. Characteristics of Present Transposition Systems.
3. Characteristics of Proposed Transposition Schemes.
4. Results of Tests.

1. *Effect of Transpositions in Reducing Induction.*—Transposing a circuit is the interchanging of the positions occupied by the conductors.

By transposing a power line the phase of the resultant electromagnetic field due to balanced currents and the phase of the resultant electrostatic field due to balanced voltages is changed, and the induction is reduced by the production of neutralizing effects in the neighboring lengths of a parallel conductor. Thus, by locating the power circuit transpositions so that each conductor occupies all of the several possible conductor positions for equal distances, a section or "barrel" is obtained within which the resultant induction on a parallel conductor due to balanced currents and voltages is completely neutralized, neglecting attenuation and remanent electrostatic effect and assuming the parallel is uniform throughout the barrel.

Inasmuch as residual currents and voltages are in phase in the several conductors, the transposition of the power circuit does not reduce the inductive effects therefrom in a parallel conductor, except as the magnitudes of the residual currents and voltages are reduced by the power circuit transposition. (See Appendix II.)

As usually constructed, the conductors of a telephone circuit are close together as compared with their distances to a power line, and the circuit is usually isolated from ground. Could the conductors of a metallic communication circuit be located at the same point in space, as is approximately true of a pair of wires twisted together, the resultant electromagnetic and electrostatic induction between the sides of the communication circuit would be zero. The voltage induced along the conductors of the telephone circuit and the induced voltage to ground would be present but would not be effective in producing any voltage between the conductors of the telephone circuit, provided the capacity and leakage to ground of each side of the telephone circuit were equal. On overhead lines the conductors of a metallic communication circuit must be at least several inches apart, hence in general when paralleled by a power line, the resultant electromagnetic and electrostatic induction in the two conductors will be unequal in magnitude. The result is that a voltage exists between the sides of the circuit which causes a current to flow in apparatus connected between the conductors, such as a telephone receiver.

Transpositions in communication circuits tend to equalize the induction in the two sides of the circuits by exposing each side equally to the influence of the power circuit, that is, by reversing in successive lengths the phase of the induction between the two sides of the circuit.

In an exposure where the induction from unbalanced currents and voltages would be completely neutralized by the power circuit transposition system if there were no communication circuit transpositions, or where such induction would be completely equalized by the communication circuit transpositions if there were no power circuit transpositions, this induction will practically always be partially cumulative if both power and communication circuit transpositions are installed without due reference to each other. It should be noted, however, that the maximum disturbances which may be set up in a parallel communication circuit by balanced currents and voltages in the power circuit will be present when neither the power circuit nor the communication circuit is transposed. Hence it is very important that the power and communication circuit transpositions be properly located with respect to each other and in this way only can the maximum benefits from the transposition be derived.

Induction from residual currents and voltages is reduced by communication circuit transpositions.

If the communication circuit has a ground return, it cannot be transposed and the power circuit transpositions alone will be effective in reducing interference arising from the balanced currents and voltages. Also, the induction into a ground return communication circuit from residual currents and voltages is not affected by transpositions, except indirectly, as previously stated. It is possible, though not of general practical application, to obtain the effect of a transposition in a grounded alternating-current power or communication circuit by means of a transformer or repeating coil.

Induction between wires and ground is harmful to metallic as well as to ground return circuits, for in case the metallic circuit is not perfectly balanced electrically, such induced voltage forces a current to circulate in the metallic circuit through the terminal apparatus. It is not practical to maintain communication circuits in a state of perfect balance at all times.

2. *Characteristics of Present Transposition Systems.*—The transposition systems used on long distance metallic telephone circuits are designed primarily to reduce the "cross-talk" or induction from one telephone circuit into another and provide for a high degree of balance between any circuit and all others on the line.

The length of standard balanced telephone transposition sections used by the Pacific Telephone and Telegraph Company is approximately eight miles (more exactly, 41,600 feet), and this is representative of the length of sections of the transposition systems used by other companies operating similar lines. To improve the transmitting qualities of telephone circuits used for long distance work, loading coils are introduced in certain circuits at the ends of the standard transposition sections. Uniform spacing of the telephone "S" poles (end poles of transposition sections) is an important consideration in the application of loading. It is important that the induction be neutralized in each section between loading points as these are points of discontinuity in the circuits.

The system now used also provides for the transposition of every circuit at actual intervals ranging from one-quarter mile to two miles, the average intervals for different circuits varying from approximately one-quarter mile to three-quarters of a mile, hence every circuit is to a certain extent balanced to induction from parallel power circuits.

In addition to the metallic circuits composed of two conductors, the telephone companies employ phantom circuits which are made up from two physical (two-wire) circuits. Each "conductor" or side of the phantom circuit consists of the two conductors which form one physical circuit. As usually made up, the physical circuits occupying adjacent horizontal positions are used for the phantom circuit. Hence, the average distance between the sides of the phantom circuit is equal to twice the distance between the conductors of the physical circuits. Due to the greater distance between the sides of the phantom circuit as compared with the physical circuits, the phantom circuits are more subject to inductive interference than the physical circuits. The phantom circuit possesses marked advantages in economy and transmission efficiency over the physical circuits composing it, hence is extensively used for the longer distances. The transpositions in the phantom circuits are spaced at average intervals for different circuits, varying approximately from three-quarters of a mile to two miles.

The purpose of transposition systems applied to power circuits has been to reduce the disturbance in parallel communication circuits and in some cases to equalize the separation of the pairs of conductors forming the several phases. Usually when transpositions have been applied to power circuits to reduce the disturbance in existing parallel communication circuits, one or more complete barrels have been provided within the total length of the exposure. The best obtainable results from power circuit transpositions will be had only when they are located with due regard to the transposition points of the communication circuit. No such practice as this has been followed in the past. The transposition systems heretofore applied to parallel power and communication circuits have therefore failed to meet the requirements for maximum effectiveness. Hence, balanced currents and voltages in the power circuits have, in general, caused more disturbance than necessary in parallel communication circuits.

3. *Characteristics of Proposed Transposition Schemes.*—It would be possible to fulfill the conditions for balance with regard to induction arising from balanced currents and voltages, by cutting a "barrel" into the power circuit between successive communication circuit transpositions. Inasmuch as telephone transposition points are ordinarily spaced at one-fourth mile intervals, this solution in the case of a three-phase power circuit would necessitate transpositions at an average spacing of one-eighth mile and a minimum spacing of one-twelfth mile, which is impracticable in most cases.

It would be possible to satisfy the conditions for balancing the induction in metallic circuits, from both balanced and residual currents and voltages, by installing any completely balanced system of communication circuit transpositions between each two successive power circuit transpositions. Assuming twelve-mile "barrels" in the power circuit, the conditions for balance could be fulfilled with the present standard telephone transposition system. However, with power circuit barrels of a length such as is essential in most parallels, this solution would require the redesign and relocation of all telephone transpositions in the exposure, involving several times as many transpositions as are normally required, with the liability of interference with the location of loading coils.

Both the above solutions satisfy the conditions for balancing the induction in metallic circuits, arising from residuals, in a length of circuit equal to twice the distance between successive communication circuit transpositions, assuming these are uniformly spaced. In the standard transposition section as now used, balance is thus obtained in distances varying from an average of approximately one-half to four miles.

Between these two comparatively simple but extreme solutions the practical but more complicated solution for general cases is to be obtained. This involves the combination of power circuit barrels of moderate length with a modified communication circuit transposition system designed to procure balance as far as practicable for all circuits. In this way coordinated transposition systems may be designated which are sufficiently flexible to meet the requirements of short parallels and portions of longer parallels separated by points of discontinuity.

In the discussion above with reference to schemes of transpositions, the balances or unbalances mentioned are those which would occur, due solely to the relative locations of transpositions, in an exposure whose physical characteristics are uniform throughout. Even with a scheme of transpositions, balanced in the sense described, applied to both power and communication circuits involved in an actual parallel, there are a number of factors as noted below, which in general are not capable of being taken into account quantitatively and because of which effective neutralization may not be obtained. These factors are:

1. Non-uniformity of separation, configuration and other physical characteristics.
2. Variation in magnitude and phase of the inductive effects along the exposure (applying particularly to the higher frequencies.)
3. Inherent inability of transpositions to completely neutralize electrostatic induction (this remanent effect can be reduced as far as desired by inserting a sufficient number of transpositions.)
4. Imperfect electrical balance of the communication circuit.

While these factors which prevent complete neutralization of the induction cannot be entirely eliminated, their effects can be abated by reducing the length of balanced transposition sections. Thus it is not sufficient merely to install transpositions in both lines so that they are balanced to each other, but, also, it is necessary to take into consideration the length of section within which balance is obtained and to make this length as short as the conditions of the particular case require.

Points of discontinuity, such as abrupt changes in power line current where a material amount of load is taken off, cross-overs, or substantial changes in separation, should, if practicable, be made neutral points (junction points of balanced sections) in the transposition scheme. Where cross-overs occur, balance should in general be obtained independently for the portions of the communication line on each side of the power circuit.

The transposition system and the location and spacing of transposition poles are factors of prime importance in the successful operation of telephone lines, on account of the mutual effects among the many circuits carried on such lines. On the other hand, transpositions in power circuits are, relatively, of minor importance in the operation of a power system and from this stand-

point the effect of small changes in the location of such transpositions is negligible. Hence, in general, the requirements of the communication circuits are the chief factors which should govern the location of all transpositions in both power and communication circuits.

An individual study is necessary to determine the best procedure for any given parallel owing to the wide variation in conditions. Thus only is it possible in each case to determine the best location and method of transpositions with regard to the requirements of both power and communication systems.

4. *Results of Tests.*—The investigation at Salinas demonstrated that the induction in a ground return circuit in the exposures concerned, arises principally from the residual voltages and currents while the induction in a metallic circuit shows principally the characteristics of the balanced voltages and currents together with some effect from the residuals. This result was to be expected as there are power circuit transpositions which reduce the induction in the conductors used as ground return circuits, due to the balanced components, but these transpositions and the transpositions in the telephone circuits are improperly located with respect to each other and therefore are inefficient as regards the induction in the metallic circuits. On the other hand, the telephone transposition system tends inherently to reduce the induction in the metallic circuits, arising from residuals. A study of the relative location of power and telephone circuit transpositions for exposure No. 2 at Salinas, indicated that by modifying the present transpositions of both circuits, it is possible to reduce materially the induction from balanced currents and voltages. Had it been feasible to take the power circuit out of service for the purpose of experimental retransposition, the above scheme, as well as one for the King City exposure, would probably have been installed and the effects thereof experimentally determined. Under the conditions existing, however, it was deemed advisable to postpone the matter of transpositions for both these exposures, pending the acquisition of further information as to the extent to which retransposition would be warranted as a permanent improvement.

The experimental study of transpositions was, therefore, transferred to another point where a power line is not the sole source of supply and can, therefore, be shut down for alterations and tests under special conditions.

The experimental determination of the practical effectiveness of transpositions has not been completed. However, an extended theoretical study of transpositions has been made, including the design of a modified telephone transposition system. This system which requires many additional transpositions is more flexible in its properties of coordination with different lengths of power circuit "barrels."

A study made to determine the relative efficiency of various schemes of transpositions designed for the Santa Cruz-Watsonville exposure of the Pacific Telephone and Telegraph Company's toll lead to the 22,000-volt line of the Coast Counties Gas and Electric Company, emphasizes the following general principles:

1. The necessity of proper relative location of power and telephone circuit transpositions.
2. The importance of the effect of cross-overs and the desirability of making them neutral points in the transposition scheme.
3. The necessity of some modification of the telephone transposition system.

APPENDIX IV—APPARATUS.

For the proper conduct of its tests and experiments the Joint Committee on Inductive Interference has secured either through purchase or on loan account from various power and communication interests apparatus of an aggregate value of over twelve thousand dollars.

The following is a brief schedule of the property in use by this Committee together with its estimated replacement value:

| | | |
|---|---|---|
| Buildings (Portable Laboratory) | | $ 480.00 |
| Furniture and Fixtures | | 128.00 |
| Apparatus—Oscillograph | $1,115.00 | |
| Oscillator | 600.00 | |
| Motor-Generator Set | 260.00 | |
| Meters | 1,202.50 | |
| Batteries | 100.00 | |
| Condensers | 990.00 | |
| Bridges | 675.00 | |
| Galvanometers | 265.00 | |
| Rheostats | 734.80 | |
| Switchboards | 135.40 | |
| Misc. Apparatus | 1,505.00 | |
| Coils and Relays | 645.00 | |
| Transformers | 2,412.50 | |
| Miscellaneous | 787.00 | |
| Photographic | 293.60 | $11,820.80 |
| Grand Total | | $12,428.80 |

The above property is owned by the Joint Committee on Inductive Interference and various power and communication companies, as follows:

| | |
|---|---|
| Joint Committee on Inductive Interference | $ 1,251.15 |
| The Pacific Telephone and Telegraph Company and American Telephone and Telegraph Company | 8,293.65 |
| Sierra and San Francisco Power Company | 2,002.50 |
| San Joaquin Light and Power Company | 300.00 |
| Pacific Gas and Electric Company | 110.00 |
| Western Union Telegraph Company | 235.00 |
| Testing Force | 236.50 |
| Total | $12,428.80 |

APPENDIX V—LIST OF TECHNICAL REPORTS.

The following is a list of the technical reports which have been prepared in connection with the investigation of the Joint Committee on Inductive Interference:

| Technical Report No. | Subject. |
|---|---|
| 1. | General outline of tests to be made at Salinas on parallels between lines of the Sierra and San Francisco Power Company, the Western Union Telegraph Company, the Southern Pacific Company, and the Pacific Telephone and Telegraph Company. (6 pages.) |
| 2. | Summary of results of tests at Morganhill on parallel between lines of the Coast Counties Gas and Electric Company and the Pacific Telephone and Telegraph Company between Morganhill and Gilroy. (8 pages.) |
| 3. | A description of the noise standard in use for measuring noise on telephone circuits in terms of a standard unit. (4 pages.) |
| 4. | A description of the instruments and methods used for the measurements of effective values of induced voltages and currents. (2 pages.) |
| 5. | A description of apparatus and connections used in measuring line and residual currents and voltages of power circuits. (6 pages.) |
| 6. | Tests of the effects of opening the secondary delta of the auto-transformer bank at Salinas. (7 pages.) |
| 7. | Tests of the induction in the block signaling circuits of the Southern Pacific Company paralleled by the Salinas-King City circuit of the Coast Valleys Gas and Electric Company. (4 pages.) |
| 8. | Tests of the induction in the telephone circuits of exposure No. 2 at Salinas under normal operating conditions of the power system, with particular reference to the effects of grounding and isolating the neutral of the Salinas auto-transformers. (16 pages.) |
| 9. | Experimental determination of the coefficients of induction for residual currents and voltages in exposure No. 2 at Salinas. (4 pages.) |
| 10. | Measurements of the harmonics of the neutral current at Salinas. (4 pages.) |

11. Investigation of current transformers, ratios, and errors due to the use of current transformers under the conditions of the tests. (21 pages.)
12. Formulae for the computation of electrostatic and electromagnetic induction from power circuits in neighboring communication circuits. (18 pages.)
13. An investigation of errors in measurements of residual voltage due to the potential transformers used and a discussion of the method of measurement at Salinas. (30 pages.)
14. Comparative tests of the noise in exposed telephone circuits with power on and off the 55,000-volt power circuit of the Sierra and San Francisco Power Company between Guadalupe and Salinas. (8 pages.)
15. Supplementary to Technical Report No. 8, differing from the earlier report in that the telephone circuits were shielded. Contains a discussion of transpositions. (22 pages.)
16. Tests of the induction in telephone circuits exposed to the Coast Counties Gas and Electric Company's 22,000-volt line between Morganhill and Gilroy with the power circuit untransposed and open at Gilroy. (4 pages.)
17. Tests of the induction in telephone circuits exposed to the Coast Counties Gas and Electric Company's 22,000-volt line between Morganhill and Gilroy, before and after installing power circuit transpositions. (24 pages.)
18. Tests of the effect, on exposed telephone circuits, of grounding one phase of the Coast Counties Gas and Electric Company's 22,000-volt three-phase delta-connected line. (4 pages.)
19. Test of the combined effects of the Coast Counties Gas and Electric Company's and the Sierra and San Francisco Power Company's circuits on the telephone circuits in the exposure between Morganhill and Gilroy. (4 pages.)
20. Tests of the effect on the residual voltage of transposing the Coast Counties Gas and Electric Company's 22,000-volt line within the exposure between Morganhill and Gilroy. (3 pages.)
21. Tests to determine the comparative effect on the noise in the exposed telephone circuits of having the power on and off the Coast Counties Gas and Electric Company's 22,000 volt line between Morganhill and Gilroy, and the effect of shielding the telephone circuit under test by grounding other circuits on the lead. (4 pages.)
22. Computation of the coefficients of induction from balanced and residual currents and voltages for the telephone circuits of exposure No. 2 at Salinas. (19 pages.)
23. Experimental determination of the coefficients of induction from residual currents and voltages, for the telephone circuits of exposure No. 2 at Salinas—more complete than Technical Report No. 9. (24 pages.)
24. Comparison of computations of Technical Report No. 22 with experimental data of Technical Report No. 23. (16 pages.)
25. Tests of induction in telephone circuits in exposure between Salinas and King City under normal operating conditions, with the neutral of the Salinas auto-transformers grounded and isolated. (20 pages.)
26. Tests of accuracy of measurement of residual current by certain current transformers. (4 pages.)
27. Tests of induction in telephone circuits in exposure No. 2 at Salinas with the North Beach steam station energizing the Sierra and San Francisco Power Company's line. Supplementary to Technical Reports Nos. 8 and 15, differing in the source of supply of the power system. (27 pages.)
28. Supplementary to Technical Reports Nos. 8 and 15. Voltage lowered 5 per cent at the Guadalupe auto-transformers which supply the power circuit. (20 pages.)
29. Determination of impedances of lines, by computations and by measurements—numerous curve sheets and tables. (65 pages.)
30. Tests of induction in telephone circuits in exposure Nos. 1 and 2 at Salinas, with the neutral of the Salinas transformers grounded and isolated. (10 pages.)
31. Supplementary to Technical Reports Nos. 8 and 15 and more complete. Includes tests with Salinas neutral grounded and isolated and with telephone circuits shielded and unshielded. (29 pages.)
32. Supplementary to Technical Report No. 25. (22 pages.)
33. Induction in test leads used at Salinas for connecting testing apparatus to the circuits of exposure No. 2 and the effect of such on the measurements of the induction from the exposure. (20 pages.)
34. Effect of changes in the insulation resistance of the telephone line on the induction in telephone circuits of exposure No. 2 at Salinas. Also supplements Technical Reports Nos. 8, 15 and 31. (24 pages.)
35. General outline of tests to be made at Santa Cruz on the parallel between lines of the Coast Counties Gas and Electric Company and the Pacific Telephone and Telegraph Company. (4 pages.)
36. Induction in telegraph circuits of the Western Union Telegraph Company and the Southern Pacific Company in exposure No. 1 between Salinas and San Jose. (8 pages.)
37. Noise tests on telephone circuits radiating from Salinas, with the neutral of the Salinas auto-transformers grounded and isolated. (4 pages.)
38. General review of tests at Salinas, summarizing reports 1, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, 33, 34, 36 and 37. (53 pages.)
39. General consideration of transpositions and a study of the results to be expected from the application of various transposition schemes to the Santa Cruz-Watsonville exposure. (36 pages.)
40. Method of measurement of capacity and conductance unbalances. (2 pages.)
41. Harmonic analysis of alternating-current waves, by oscillograph and resonant shunt. Comparison of the methods. (30 pages.)
42. Investigation of the current transformers in use at Santa Cruz to determine their ratios of transformation and suitability for residual current measurements. (35 pages.)
43. Outline of tests to determine the effect of extraneous currents on the intelligibility of telephone conversation. (8 pages.)
44. Induction in the telephone circuits of the Santa Cruz-Watsonville exposure and in the test leads, from sources other than the 22,000-volt line. (12 pages.)
45. Induction in the telephone circuits of the Santa Cruz-Watsonville exposure under commercial operating conditions, with the original transpositions in both power and telephone lines. (15 pages.)
46. Supplementary to Technical Report No. 39. A study of additional transposition schemes for the Santa Cruz-Watsonville exposure. (14 pages.)
47. Computation of the coefficients of induction for balanced and residual currents and voltages for the Santa Cruz-Watsonville exposure. (11 pages.)
48. Experimental determination of coefficients of induction in the Santa Cruz-Watsonville exposure, with the original transpositions. (42 pages.)
49. Further experimental determination of coefficients of induction for balanced voltages, in the Santa Cruz-Watsonville exposure, with the original transpositions. (13 pages.)
50. Study of the influence of various transformer connections and flux densities on the third harmonic and its multiples in a three-phase circuit. (In preparation.)

## I. T. Bond Buyers Sue

Suits for amounts aggregating, with interest, about $80,000, were filed in the circuit court October 28, against the estate of Adolphus Busch by former bondholders of the Independent Telephone Company, of New Jersey, of which Mr. Busch was a director.

The plaintiffs were David Master, Jr., Charles C. Master, Ralph H. Williams, Frederick F. Wood and Mrs. Mary A. Richards.

It is alleged that they bought bonds of the telephone company in 1905, when the company was not in a good financial condition. David Master bought $28,000 of the bonds; Charles Master, $11,000; Williams, $5,000; Wood, $4,000, and Mrs. Richards, $3,000, it is recited.

Alvan J. Goodbar, who filed the suits, stated that when the telephone company was liquidated the bondholders received $15.16 on each $1,000 bond.

The suit is directed against August A. Busch, son of Mr. Busch; Mrs. Lily Busch, widow, and Charles Nagel, executors and trustees of the Busch estate, and Edward A. Faust, executor.

August A. Busch said he knew very little about the telephone company matter. His father was made a director, he said, without his knowledge.

# Telephone Plant with Relation to Fire

*Presented Before the Portland, Oregon, Sections of the N. E. L. A. and A. I. E. E.*

BY W. D. SCOTT AND G. P. NOCK

IN the ordinary life of a community there is probably no one thing that will bring out a crowd, at any time of day or night, as will a fire, and I think it is safe to assume that everybody has a dread of fire, not only because of the financial losses that it causes, but from the dangers involved and the tremendous uncertainties which are always present.

In presenting this paper to you it is our idea that there are certain relations between the telephone industry and fires that are not to be found in other lines of business. The widespread territory covered by the telephone plant and the vast number of complicated circuits in the telephone companies' central offices offer a large field for damage by fire, especially from sources over which we have no control.

A very small fire in a switchboard and one which, in other places, would probably be of no consequence whatever, will often do a large amount of damage, not only to the plant itself, but to the entire community, as the latter may find itself without telephone service for hours or even days, and in these modern times telephone service has ceased to be a luxury, and is now a business necessity.

The telephone company has its own particular fire hazard. There is not only the fire hazard of the plant itself, but because of its distributed nature, reaching as it does over an entire community, serious damage may be caused through a fire hazard which the telephone company is in no way responsible for and can in no way abate.

Reaching out from its central offices is its distributing system of wires and cables. In the more congested districts of the larger communities and wherever it is commercially possible to do so, the wires of the telephone companies have been placed under ground. In the residence districts and in the outlying portions which are thinly settled we are, as yet, unable to place our wires under ground except at an expense which would make the cost of telephone service prohibitive. The type of aerial construction which is now placed on poles is vastly superior to that which was in vogue several years ago. No longer do you see the high pole, 60 or 70 or 100 feet high, filled from its top almost to its bottom with crossarms and carrying possibly 100 or more separate wires. Today the high pole lead has been replaced by a short one and all the separate wires have been grouped together and placed in cable. In this way many risks of fire and damage by foreign electrical currents have been obviated.

Even now, in a city there is always a possibility that the wires of the signal company, such as the telephone company, may become crossed with power wires. Such an accident may result in a current of electrical energy many times larger than telephone current being carried by the telephone wire. Without some adequate means of protection this electrical current may be taken in the buildings of the customers or into the central offices of the telephone company.

### PROTECTIVE SYSTEM.

At each subscriber station where there is any possibility of a connection being established between the wires of the telephone company and the wires of the power company, a protective device is installed to operate automatically in case the wires of the telephone company should ever carry any excessive amount of current. At all of the junctions between aerial and underground cables similar protective devices are placed in order that the line may be opened by means of this protective equipment under conditions of excessive strain due to surplus quantities of electrical energy.

In the earlier years of the telephone industry considerable damage was sometimes done through lightning. Damage from this source usually occurred to plant and property of the telephone company through the destruction of instruments, cables or central office equipment. Included in the protection installed in the telephone company's premises, in their cable boxes and at the subscribers' stations is a protective device which conveys to earth lightning discharges and in this way prevents damage. Inside of the central office itself, where is placed the brain of the telephone industry, the entering wires or cables are equipped with protectors, which will carry to ground any electrical current that is of sufficient magnitude to damage the central office equipment or cause a fire.

The design and operation of this protective system shows to what extent the fire risk incident to electrical hazard in an extensive wire plant has been considered.

For convenience we have divided it into three groups:

*First:* The subscriber's station.
*Second:* The cable plant.
*Third:* The central office.

*At the subscriber's station* two fuses are provided. These fuses consist of a fibre or porcelain tube approximately 5 inches long, arranged at the ends with suitable terminals for holding the wires and containing in the center of the tube a strip of metallic alloy which will melt when the current carried by the metal strip exceeds a predetermined amount.

The wires to the subscriber's premises are attached to these fuses, either on the outside of the building or immediately inside of the building. When placed inside they are mounted on porcelain supports and all wiring is carried on porcelain insulators and well separated.

Associated with these fuses is a metal-covered porcelain block on which are mounted four small pieces of carbon. These pieces of carbon are separated by a piece of notched mica .0055 inches in thickness. Two of the carbon blocks are connected to earth and two are connected to the line wires. Under normal conditions the thin piece of mica separates the two carbons connected to the line from the two pieces of carbon connected to ground.

The air gap between the two pieces of carbon is such that a potential of 300 volts will arc across between the carbons to ground. In one of the carbons is a plug of readily fusible metal which will melt and connect the two carbon blocks solidly together. Should an excess current ground the line through the carbon blocks there is a sudden rush of current in the line

and the metallic strip in the fuse melts and opens the line.

At the junction of the aerial wire and the cable plant, fuses, which are duplicates of the ones at the subscriber's station, are placed. In addition to this where the open wire is subject to lightning disturbances copper blocks separated by a thin piece of mica are installed. These copper blocks are arranged similarly to the ones at the subscriber's station, but operates a potential of 1,000 volts instead of 300.

*In the central office,* as near as possible to the point of entrance, is placed a set of carbon blocks similar to the ones at the subscriber's station and in addition a piece of apparatus known as a "heat coil."

This equipment consists of a small coil of fine wire wound over a copper shell. Inside this copper shell is a tinned copper pin held in place by solder which has a low temperature coefficient. A current of .5 of an ampere passing through the coil of wire will cause the solder to melt in less than 210 seconds. The melting of the solder will release the pin and by means of the device which holds the heat coil in place, the pin is forced in contact with a grounded plate.

The central office protection will complete a connection to earth in two ways. One, through a voltage in excess of 300 volts jumping the air gaps between the carbon blocks to ground and the other through a very small current melting the solder of the heat coil. The operation of either of these protective devices permits the excess current on the line conductors flowing directly to earth. Any sudden rush of current caused through grounding the line opens the fuses, which are placed between the aerial and underground plants or between the open wires and cabled conductors.

### CONSTRUCTIONAL PRECAUTIONS.

In order still further to reduce the hazard which might be caused by electrical construction of all kinds efforts are being constantly made to improve conditions and methods. A joint committee from various electrical associations has adopted specifications for "Overhead Crossings of Electrical Light and Power Lines." These specifications apply to overhead electrical light and power line crossings over railroad right of way, tracks, or lines of wires, and to overhead electric light and power wires of over 5000 volts constant potential, crossing or constructed over telephone, telegraph or other similar lines.

They set forth in detail the location and kinds of supports to be used, the clearance between wires, distance from inflammable material, the size and kind of conductors to be used, guys, clearing of spaces about supports so that they may be free from inflammable material, and many other important details. They represent the consensus of opinion of the best available engineering talent in this country as to what is considered safe construction, when it is necessary that the wires of one wire using company cross over the wires of another company or over the tracks of a railway company.

Realizing the importance of this subject, the various public service and railroad commissions have adopted rules covering construction methods which take into consideration fire risk and possible injury to employes or the general public.

In addition to this the various municipalities have their own sets of rules.

In many cities there are joint pole agreements in force between the various pole using companies. These agreements have to do with the joint occupancy of poles by more than one company. This arrangement does away with the number of poles in the streets and has led to each company placing a more substantial type of construction.

Generally the outside plants of wire using companies are being constructed at present in a more substantial manner than in the past. The various interests see that the whole public can be best served by a complete understanding as to what is required of all and are trying to furnish their own service, be it light, power, telephone or telegraph, in such a manner as to reduce the total hazard to a minimum.

### HOUSING APPARATUS.

The apparatus inside of a telephone office is complicated. Not only is this true on account of the functions which it has to perform, but further complications are introduced through limited amount of space which can be economically used for accommodating a comparatively large quantity of equipment.

From the very nature of the equipment it is very subject to damage from water or fire.

The first essential of a central office is proper housing. The buildings must be well built, they must afford proper space for the equipment and they must be so designed as to afford ample light and air for the employes. In addition proper fire protection measures in the way of emergency exits and fire protective apparatus must be provided.

It is now generally the practice for the telephone companies to erect their own buildings in all of the larger cities. These buildings are of two classes—the so-called slow burning mill type of construction or the latest type of steel frame, concrete fire-proofed construction with reinforced concrete floors.

Buildings of the slow burning mill construction type are only erected in the outlying or residential sections and are usually built with brick or reinforced concrete walls. The floors consist of timbers 2 inches in width and varying thickness from 14 inches up, spiked solidly together. These floors are supported on heavy timbers which are in turn supported by cast iron or wooden pillars.

Buildings of the steel frame type have the steel framing fire-proofed with reinforced concrete and reinforced concrete floors. The walls are either of brick, terra cotta or reinforced concrete.

In both types of buildings exposed openings or openings adjacent to other buildings have steel sash and window frames and are glazed with wire glass.

In buildings of the steel frame type all sash doors and trim are of metal. All exposed openings, in addition to the wire glass, are protected with fire shutters. These fire shutters are equipped with fusible links and will close automatically if the link becomes fused. All doors at fire and fuel rooms and entrances to cable pits are held open by means of a weight attached to a fusible link. These doors will close by gravity if the link is fused.

Exterior and interior stand pipe systems are installed. The interior stand pipe system is equipped with a fire hose and nozzle at each floor and where a high pressure system of street mains is provided the interior stand pipe system is connected to this system of high pressure mains.

Where it was thought that the pressure of the water system will not at all times be sufficient to meet all emergencies, a direct connected, motor driven cen-

trifugal pump is placed in series with the standpipe. An automatic controlling and motor starting device is associated with the motor so that the motor will start if the water pressure falls below a predetermined amount. Another safeguard is provided in this system. Should the water fail, the stand pipe is carried to the street where a connection can be made to a fire engine. An automatic check valve prevents the engine from forcing water back into the mains.

All elevators are enclosed in a fire-proof elevator shaft with tight doors. The doors themselves are of steel and where glass is provided it is of the wire type.

The fire escapes are stairs of ample width with substantial landings. The exists to the fire escapes are provided with "panic bolts" on the doors. Lights are provided on all fire escapes and these lights are placed on circuits separated from the other lighting circuits of the building.

Where electric elevators are used the leads to the motors are separated from the other electrical wiring of the building and if it should ever be necessary to cut off all of the current from the rest of the building the elevators will still be supplied.

Every effort has been made to have our buildings constructed in accordance with the best advice we can obtain in order that they may be as safe from fire risks within and without as the light of our present knowledge will permit.

Should such a catastrophe as a fire occur we have adopted every device shown to have merit in order that the lives of our employes may be protected to the utmost.

In giving these brief outlines of our building construction we have indicated what are our present methods. Time alone will tell whether or not these present methods will appear as crude in the future as our past efforts do in the light of our present knowledge.

### METHODS OF FIRE PROTECTION.

On account of the value of service all telephone companies have taken particular precautions in connection with protection of their central office apparatus against fire.

The various pieces of apparatus can be readily damaged beyond repair by the use of a chemical fire extinguisher. It is doubtful that any more severe damage can be done in the central office of a telephone company than by throwing water on a fire in a telephone switchboard.

As you know, the general practice in all of the larger communities on this continent is to provide telephone systems of the so-called "common battery type." This means that all of the signaling and talking functions are supplied with the necessary electrical energy from a common source located within the central office.

Present practice is to use a storage battery for this purpose. The voltage of this battery is seldom less than 22 volts and as far as I know does not exceed 50 volts. The quantity of current under normal conditions does not exceed approximately .1 of an ampere in any part of any one circuit. These amounts of electrical energy are so small that, provided no greater quantity ever flowed, it is probable no fire hazard would ever result.

Accidents, however, are apt to occur. It is necessary to protect the apparatus against dangerously large flows of current. Individual fuses are provided which limit the flow of current in the various circuits to quantities of 1 1-3, 2 or 5 amperes. These fuses are provided with a visual and audible alarm which immediately indicates to the attendant an operated fuse. Immediate attention can then be given to determine the cause of the trouble.

The switchboards themselves are constructed of steel frames over which a wood covering is placed, the wood simply protecting the interior from dust and giving a good appearance. No more wood than is absolutely necessary is ever used. All of the racks for holding the wires, cables and other pieces of apparatus are of steel. The boards themselves are divided into sections by means of steel screens. Each section of frame-work is sub-divided horizontally by means of steel screens so that the sections are in three parts.

If, in spite of the automatic fuses, or in case of accident or through carelessness, a fire should start in any particular switchboard section, the remaining portion of the switchboard and in fact the remainder of the particular switchboard section is cut off from fire damage by means of these screens.

It is generally necessary to run wires and cables from one floor to the other. In such locations a hole through the floor is necessary. Where such a hole is placed it is faced with steel and after the wires have been placed is closed completely by means of boards constructed of asbestos and cement.

### FIRE-FIGHTING APPARATUS.

For fire-fighting purposes there is installed in every central office four different kinds of fire-fighting apparatus: First, a pail filled with sand; second, an asbestos blanket; third, a fire extinguisher called a "dry gas fire extinguisher;" fourth, the well-known portable chemical fire extinguisher (our last resort).

After providing all the various methods for protection against a possible fire without an adequate and carefully supervised system among the employes, without training them as to what to do in case of an emergency, the provision of this equipment would be of little value. So that all our employes may know the uses of the fire protective apparatus, and be familiar with the steps to be taken in case of fire, complete instructions, including a system of fire drills have been issued.

An electrically operated fire bell system is provided for the notification of all employes that there is a fire. Immediately upon the sounding of the fire signal the operators leave their switchboards and march directly to a building exit and down the street. Various signals indicate what particular exit or groups of exits shall be used.

A diagram of each floor of the building is provided, which shows the various exits and line of march to be taken by the employes. The employes familiarize themselves, not only by looking at the diagram, but by actual participation in the fire drills as to best way to leave the building. We have the employes leave their work and leave the building. It was thought at one time that the nature of telephone service, particularly in the middle of the day when there was a large volume of business, was such that it would be impractical to give up the telephone service for a sufficient length of time to allow our employes to get to the ground and back again. We have now had this fire drill plan in operation for some months and have not experienced any serious service complaints. Generally the customers upon being advised of the reason for delay have been satisfied.

Regular stations, such as fire fighting equipment, fire escapes and other important points are assigned to the male employes, who go directly to these stations immediately upon the sounding of an alarm.

The duties of the various employes have been carefully studied and assigned so that there are employes to look after the fire doors and shutters, to look after the fire extinguishers, to assist in every way in the safety of the employes, to preserve discipline and to see that the various parts of the drill are carried out expeditiously and without disorder.

Over the top of the switchboard is a waterproof cover and an employe is assigned to see that this cover is pulled over the board should occasion ever be necessary. Other employes are to see that office records are properly removed, and still other employes take up locations at the fire escapes.

It is the duty of the particular man in charge of any one office to see that the city fire department is immediately notified in event of fire at any point of the telephone company's premises.

General hints in connection with fire protection, such as refuse, stoves, furnaces and oil and other combustible materials are also contained in the instructions.

In compiling these instructions and making them effective we have had several conferences with various fire marshals and fire chiefs in cities where this plan is in vogue. In every case we have received a hearty endorsement and not only have the various fire chiefs taken considerable interest in our plan, but have rendered us material assistance through many valuable suggestions which they have made in connection with the provisions of adequate exits, the matter of seeing that fire doors can be readily opened by means of panic bolts instead of ordinary door knobs, the provision of adequate and safe fire escapes, and many other points. They have also learned that water is the last thing to be turned on in a telephone office.

These precautions are not necessary on account of telephone operating equipment representing a fire hazard. On the contrary fire insurance companies regard telephone buildings and their contents as a desirable risk. They are necessary because of the value of uninterrupted service to the public.

The safety of our employes, the complicated nature of the mechanical construction, the ease with which it may be damaged beyond repair through moisture or chemicals and the ever present possibility of uninstructed effort doing more harm than good, have been some of our principal reasons for spending considerable thought on fire and its prevention.

Such fires as we have experienced have usually occurred during the time that an equipment was being assembled or when an addition was being made.

It is necessary that we solder wires together or to pieces of apparatus. Beeswax heated almost to the boiling point is used to saturate the ends of the cables. Paint and oils are a necessity. Artificial light has to be used.

We surround the work with every precaution. Smoking is prohibited. Insulated guards are placed over electric lights. Where portable gas furnaces are used for heating soldering irons, the rubber hose is incased with steel wire. Oils and paints are kept outside of the building in fire-proof containers.

Fortunately so far on the Pacific Coast we have escaped a serious fire in any of our offices, except, of course, in San Francisco at the time of the earthquake. This cannot be said, however, for other portions of the country.

During the month of March a serious fire occurred at Worcester, Mass. This fire rendered inoperative telephone service to about 150,000 subscribers and, like some of our other fires, we have never been able to determine exactly what caused it. The resulting damage occasioned as much work as the establishment of an entire new central office equipment. The work of repairs was completed in 9 days, and when it is known that there were nearly 20,000 telephone instruments connected to this switchboard handling over 1,000,000 telephone calls a day, the difficulty of the task which confronted the employes of the telephone company can to a limited extent be realized by everyone. The particular building in which the equipment was located was undergoing alterations and the fire started in a portion of the building which was used by the building contractor as an office. Due to the temporary alterations which were then in progress, the fire spread rapidly to other portions of the building, which under normal conditions it would not have been able to reach.

The fire started at the time when there were few employes on duty, and through that cause gained considerable headway before it was discovered. The greatest amount of damage, however, was not done by the fire itself, but was done by the water, which was put on the burning portions of the cables. In justification of the fire department, however, there must have been upon its arrival a severe blaze in a portion of the equipment, and to one not familiar with telephone apparatus the action taken of pouring on a large quantity of water was in all probability justified.

Another aspect of the value of telephone service to a community is illustrated by what happened at Salem, Mass., during the time when Salem had its $15,000,000 conflagration in June of this year. The central office of the telephone company was not burned, but the telephone company lost about 1000 telephones and the long-distance cable plant was badly damaged and about 25 employes were made homeless.

A common desire to do everything possible for the benefit of the telephone using public, supplemented by a loyalty to the company that characterizes their work everywhere in great emergencies, was the spirit that dominated these employes and resulted in wide-spread commendation.

The faithfulness and heroism of the operators was remarkable. What they did in those trying hours during the fire and later makes one of the most dramatic stories of the conflagration. Their work was superb. It could not have been better. The homes of twelve operators were burned—one in every eight of the entire force of ninety-five. And yet for more than an hour these girls, with others, sat at the switchboards with coats and hats on and answered thousands of calls from excited subscribers while the great fire raged within five hundred feet of the central office and the lurid flames could be seen more than one hundred feet in the air. Although the front windows were too hot to touch, these young women remained at their work without indication of fright or nervousness. During the night they worked by the red light of the fire and lanterns after the electric and gas lights had gone out. Those who were in the operating rooms during this period and witnessed the work of these girls pay willing testimony that every one was a true heroine of the switchboard. Many knew their homes had been burned, or were in the path of the fire, and yet they continued their nerve-racking work as though nothing out of the ordinary was happening.

It was providential that the telephone central office was not burned, for the service was indispensable during

the fire in summoning help from twenty-two cities and towns and calling over two hundred militiamen and a number of state officials. After the conflagration the service was of equal value, if not more so, as a means of quick communication for those engaged in the splendid relief work.

Early in the afternoon of Thursday, when it became positive to the city officials that the fire was beyond control, the first appeal was made to the telephone company for help. In response, operators were given the names of every member of the Second Corps of Cadets and of Company H of the Eighth Regiment. They went to work immediately, and in about one hour most of the men were at the armory and ready for guard duty.

Simultaneously, other operators were sending out the call for firemen and police in various places, and it was not long before fire apparatus and officers were coming to the stricken city from all directions. During the evening the central office was visited repeatedly by fire and police officials, who sent directions out over the wires from the chief operator's desk.

It is evident from the example at Salem that in event of a severe conflagration immediate steps should be taken for the protection of telephone plant and equipment in order that at the time of the greatest need the citizens may have ready means of communication.

Thus we see the telephone plays an all-important part in the daily life of any community. It is indispensable in an emergency. Therefore, in order that it may be available when needed the most, every possible precaution must be exercised to keep, not only the telephone buildings and central office plant in working order, but the entire distributing system serving every office. It is felt that the telephone companies are doing all in their power to bring this about, and with a better knowledge by the public of the peculiar conditions which apply to the maintenance of the telephone plant and their cooperation, we believe that the highest efficiency possible will be obtained in the telephone service, and the telephone companies will be able to realize their aim, "To furnish reliable and prompt telephone service and to deal courteously with everybody."

## Texas Independents Convene at Waco

The eighth annual convention of the Texas Independent Telephone Association, held at Waco, Tex., adjourned, November 16, with C. A. Shock, of Sherman, the newly elected president of the association, in the chair. The convention was attended by 117 telephone men.

The entire ticket brought in by the nominating committee was elected without opposition or change. Headed by Mr. Shock, well-known independent operator, the newly elected officers are: Vice-presidents, J. B. Earle, Waco; S. A. Lindsey, Tyler; J. C. Casler, Dallas, and T. H. Hughes, Palestine; secretary, E. C. Blomeyer, Waco; treasurer, W. K. McQuown, Sherman. The officers of the association constitute the executive board.

The second day's session convened at 9 o'clock in the morning, lasting without recess until the adjournment. The meeting opened with a talk by Vice-President A. J. Combs, of Haskell. General Superintendent H. E. Kepler, of the Texas Telephone Company, talked on "Telephone Management." State Treasurer McQuown read a paper on "Telephone Collections," followed by talks by H. B. Wagner and Will Green, of Waco, respectively general traffic manager and chief engineer of the Texas Telephone Company. Stanley Alderman, of Big Spring, secretary of the Telephone Exchange Owners' Association, spoke on the importance of standardizing material and equipment. Short talks were made by several other speakers on different subjects.

The regulations of the new war tax bill were explained by E. C. Blomeyer. This bill imposes a tax of one cent on every telephone message costing 15 cents or more. A committee composed of L. S. Gardner, Waco; F. S. Merril, Jr., Tyler, and W. K. McQuown was appointed to recommend methods for handling the collection of the tax, which becomes effective all over the country on December 1.

The committee on resolutions, composed of E. C. Blomeyer, C. A. Shock and J. Smith, reported seven resolutions to the convention, all of which were adopted. Chief among these was the resolution opposing the creating of a public service commission for this state.

The association went on record as strenuously opposing the present taxation of telephone companies and denouncing the gross receipts or "occupation" tax of 1½ per cent on all gross receipts of the business.

Resolutions were passed urging certain changes in the employes' compensation act, passed by the last legislature, and a vote of thanks was tendered the press and telephone publications for publicity given the business.

Luncheon was served the members in a body on each day of the meeting at the Riggins hotel, with the Texas Telephone Company as host. The local company also furnished tickets to the Cotton Palace to all the visitors, and the red ribbon badge of the telephone men was very much in evidence on the exposition grounds.

The convention hall of the Y. M. B. L. was handsomely decorated for the meeting, and a number of exhibits of telephone apparatus and equipment were made by manufacturers in the north and east. Several working telephone switchboards and lines were installed in the hall and handsome souvenirs were distributed among the telephone men by the exhibitors. It was stated by an officer of the association that the displays of apparatus were the most elaborate ever shown at a telephone convention in the south.

Managers of the various exchanges and officers of the Texas Telephone Company who were present remained over for a business meeting of all the managers and department heads of the telephone company held in the company's offices.

## Fire Protection Electrical Committee

The biennial meeting of the electrical committee of the National Fire Protection Association will be held in March, 1915, in New York City, the day and place of the meeting to be announced later. As usual, the provisions of the National Electrical Code as they now exist will be considered, together with reports of all sub-committees.

Suggestions for amendments to the code, in order to be included in the bulletin, must be specific and where a change is desired in a rule or section of a rule definite wording for such change must be given together with the reasons why the change is recommended and these suggestions, together with all committee reports must be in the hands of the secretary not later than January 15, 1915.

As heretofore, the meeting will be open to all interested and such persons will not only be welcome but are urged to be present and give the committee the advantage of their experience and advice.

# Public Utility Commission News

*Reports Concerning the Activities of State Regulating Bodies in the Telephone Field*

## Illinois

THE Illinois commission has issued the following regulations for telephone service in the state:

All free and reduced rate service is prohibited by the act providing for the regulation of public utilities. Section 39, article 4, of that act reads as follows:

No public utility, or any officer or agent thereof, or any person acting for or employed by it, shall directly or indirectly, by any device or means whatsoever, suffer or permit any corporation or person to obtain any service, commodity, or product at less than the rate or other charge then established and in force as shown by the schedules filed and in effect at the time. No person or corporation shall, directly or indirectly, by any device or means whatsoever, whether with or without the consent or connivance of a public utility or any of its officers, agents, or employes, seek to obtain or obtain any service, commodity, or product at less than the rate or other charge then established and in force therefor.

Consequently all free and reduced rate service now given to public offices and officers in the various municipalities is prohibited by the above.

The law prohibits free local service from public pay stations; it also prohibits free toll service for a part only of the subscribers of the telephone company and not for all the subscribers, similarly situated.

Where telephone service in railway stations may be reasonably required under the provisions of Section 49 of the state public utilities law, railway companies should pay the regular business rate for such service. In railway stations at which the railway company cannot reasonably be expected to pay for a telephone, or where it already pays for one or more telephones, telephone companies may be permitted, if they so desire, to place a pay station telephone equipped with a coin collector. At large railway stations telephone companies may be permitted to install public pay stations.

The classification of telephone subscribers into business and residence subscribers with higher rates for the former than for the latter is reasonable and permissible. (1) Because of the greater cost of providing business service, and (2) because it is a well established principle that a lower residence rate is necessary in order that a sufficiently large number of subscribers may be secured to make the telephone valuable to all users. An extension of this classification may be made so as to apply to churches, hospitals and other charitable institutions, provided that the two principles of cost and service to other subscribers are continually kept in view, and provided further that such classification shall not apply to any institution supported by public taxation. Where the place of business and the residence of a subscriber are in the same premises, and no telephone is installed in the place of business, the business rate should be charged for the telephone installed in the residence.

Every telephone company which offers business and telephone rates should publish a separate and distinct rate for business residence and for residence telephones, and a so-called combined rate for a business telephone and a residence telephone which is less than the sum of the regularly published residence and business rates is unlawful.

It is lawful for telephone companies to furnish free toll service to their respective subscribers provided the same is given to all subscribers alike.

Where special rates have been in effect under individual contracts, said rates shall be changed to conform to the regular schedule rates.

It is lawful for telephone companies to offer discounts from the regular charge on conditions of payment of the bill on or before a certain date, provided that such discount rules are strictly complied with, without discrimination.

In cases where the company provides special wiring or special apparatus to meet special conditions, it is lawful to collect a special installation charge to cover the additional expense incurred.

Telephones installed or used for short periods of time, such as telephones in temporary business places, summer cottages, political headquarters, etc., may be charged a higher rate than the proportionate charge of the regular annual rate for the respective class of service under the regular schedule.

A charge may be made for removing telephones from one address to another after the first installation and prior to the expiration of the term of the subscription or contract for service, provided that the amount of this charge shall be as nearly as possible the actual cost of performing the work.

It is therefore, ordered, that all telephone companies doing business in the state of Illinois change their rates, rules and classifications, not at present in harmony with this ruling, to conform with the same. Two months will be considered an adequate period of time within which to comply with the provisions of this order.

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Rulings which indicate that the commission proposes to take jurisdiction over practically every telephone company in Illinois, the mutual as well as the publicly operated, hold that any telephone company which operates in a city or village under a franchise is a public utility, even though it furnishes service only to its stockholders.

At the time the utilities act became operative, the mutual companies in the state took the attitude that they were not under the law because they were not operating for the public but only for their owners. In the Bethany Mutual Telephone Company case the company shattered this belief, but in the cases of the Pike County Telephone Company *vs.* H. G. Noble and others to restrain the construction of a telephone system at Perry and the Noble Telephone Company *vs.* the Noble Mutual Telephone Company, the commission goes into greater detail.

In the Pike county case, the respondents plead that they had applied to the secretary of state for incorporation papers as a company not for profit, that they were going to furnish telephone service only to stockholders, and extend farmers' lines in the vicinity of Perry, and that therefore the company would not be a public utility. Says the commission:

It appears from the record that anyone in the community that will be served by the telephone company that the respondents are organizing, can secure such service by becoming a stockholder in said company. In other words, it appears that such service is open, under the same terms and conditions to all alike; that any member of the public can secure telephone service on the same basis as any subscriber or other person; namely, by becoming a stockholder. It also appears that said telephone

company proposes to use not only the public highways in the vicinity of Perry, but that it also proposes to use the public streets and alleys of said village for its poles, wires and other appliances under a license or franchise secured from the president and board of trustees of said village authorizing it so to do.

The law seems well settled that a municipality having control of the public streets can only grant an easement or right therein for a public use.

It further appears that by the terms of the permit or grant from the village of Perry to use the public streets and alleys therein, the respondents are required to install a telephone exchange in said village and to keep such exchange open for the accommodation of the patrons and public at all reasonable hours.

Under the facts as shown by the records in this case and in view of the law in this state, it is difficult to perceive wherein the telephone company that is being organized by the respondents will not be for the public use.

The decision in the other case, which is very similar, follows the same line of reasoning. In both cases the respondents are prohibited from building telephone exchanges without permission from the utilities commission.

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The question of the jurisdiction of the state utilities commission over mutual telephone companies has been appealed to the circuit court at Springfield for decision. The case is that of the Macon County Telephone Company against the Bethany Mutual Company, in which the commission ruled that mutual companies which use the streets are public utilities and come under the state utilities law.

The Macon County Telephone Company filed suit before the commission for an order restraining the operation of the other company. The commission refused the restraining order but found that the Bethany Mutual Company had not received from the commission an order showing that the company was either a necessity or a convenience and ordered that the company cease doing business.

The Bethany company was incorporated on April 16, 1914, after the state utilities law had gone into effect.

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In what is known as conference ruling No. 150 the Illinois state public utilities commission has advised that 16 per cent on the investment is what the commission regards as a legitimate return on business done by rural telephone companies throughout the state. The commission does not set this as the irrevocable maximum, but states that it will be inclined to count any return over that as excessive and therefore not equitable. The ruling contemplates 8 per cent for interest and 8 per cent for depreciation.

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## New York

A meeting for the purpose of bringing various complaints against the Mountain Home Telephone Company before the New York Public Service Commission was held at Watertown, November 6.

Frank Irvine of the commission took testimony. The telephone company was represented by Thomas Spratt of Ogdensburg, and I. A. Griswold, president of the company.

George A. Clark and Charles Dullea, of Potsdam, and Matthew Wallace, of Crary Mills, represented the grange interests, and William A. Moore, of Potsdam and New York city, appeared to substantiate a complaint he had previously laid before the commission.

The chamber of commerce of Canton was represented by George E. Sims, Wilfred Woodhead and Charles A. Hamilton.

Messrs. Clark, Dullea and Wallace complained of the raise in rates and of being obliged to pay toll charges except for a small territory. They said they had no means of investigating the question as to whether the company is justified or not in raising the yearly rates, and asked the commissioner to investigate the matter thoroughly.

Mr. Moore stated that he is obliged to pay $15 a year for the use of a telephone in his summer residence at Potsdam, on which the company will grant him a rebate of $2 per year, which he has refused to accept. The telephone is used only four months out of the year.

John P. Boylan, the chief engineer and general manager of the concern, gave many reasons from the standpoint of the company why the rates were raised and why they could not give more rebate than was shown in the case. Mr. Moore questioned him closely as to whether, if a telephone was ordered taken out of house about to be vacated, it was not used by the new occupant, as far as the village of Potsdam is concerned, and secured an admission that such is the fact in many cases. Mr. Boylan said there were 750 telephones in the Canton area until the raise, but that some have been taken out.

It was finally decided to adjourn the hearing on these complaints, to be taken up again at Pittsburgh or Malone in connection with the complaints from those places.

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## Kansas

Permission was granted October 27 by the Kansas public utilities commission to the Farmers' Mutual Independent Telephone Company of Elmdale, Kan., to engage in business in the state as a public utility. The application was granted after a considerable contest. In its opinion the commission admits that permission was granted reluctantly, against the precedent established by the board of not allowing duplication of telephone service where one company already is giving efficient service.

A number of letters from the patrons of the Missouri and Kansas Telephone Company were introduced in the evidence, which stated that the service of the company was satisfactory and that the installation of another telephone plant would be objectionable and impractical.

However, it did not appear to the commission that the basic principles underlying the conclusions on this question and the arguments advanced in support of the same were applicable to the case before it. It was not a question of compelling efficient and sufficient service to patrons in a specified territory, but there was involved the question of inaugurating a public service in a much larger and wider field.

The new company represented that it would furnish free toll service to patrons of the independent lines in Chase, Marion, Lyon, Morris, Dickinson and Butler counties.

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## Florida

David Laird, general manager of the Southern Bell Telephone and Telegraph Company in Georgia and Florida, with headquarters in Savannah, was at the capital recently in conference with the railroad commissioners in connection with proposed schedules of telephone exchange rates for Pablo Beach, where an exchange had just been put in. The commissioners expressed themselves as unwilling to approve the rates proposed, it being their opinion that they were too high. Mr. Laird explained to the commissioners that there were only fifteen or twenty stations on the Pablo exchange, not enough to

pay expenses. Under these conditions the commissioners approved the rates following the conference.

## Missouri

A delegation of the members of various commercial bodies of Sedalia appeared before the Missouri Public Service Commission at Jefferson City to urge the issuance of an order requiring all of the telegraph and telephone and other wire companies utilizing the streets of that city to carry them underground in the business sections.

## Nebraska

The Lincoln Telephone and Telegraph Company has asked for permission to change its Benet exchange from a grounded circuit to the metallic circuit and also for the installation of the following rates:

| | Per month. |
|---|---|
| Independent business | $2.50 |
| Two-party business | 2.00 |
| Independent residence | 1.50 |
| Two-party residence | 1.25 |
| Ten-party farm | 1.50 |

The company states that a petition was circulated among the subscribers of the exchange and the following result shown:

| | |
|---|---|
| For change and rates proposed | 174 |
| Not opposed, but did not care to sign | 111 |
| Opposed to both rates and change to metallic service | 33 |

## Oregon

Permission to increase its rates so its net revenues may be between 7 and 8 per cent has been granted the Interurban Telephone Company, of Silverton, by the State Railroad Commission of Oregon. The commission found the actual value of the plant to be $17,702, and reproduction cost to be $25,231. Its operating expenses for 1913 were $4,938.78 and its net revenue $2,561.63.

New rates authorized by the commission are as follows: Business telephones, one-party, monthly, $2.25; two-party, $2; four-party, $1.75. Residence telephones, one-party, $1.75; two-party, $1.50 and four-party, $1.25. The rate for farmer-party lines is $5 a year.

Stating that it is convinced, after a preliminary investigation of the rates and regulations of the Pacific Telephone & Telegraph Company, that sufficient grounds exist to warrant a formal investigation to determine their reasonableness and justness, the State Railroad Commission held a hearing on November 27.

The hearing was wide in its scope, probing all the company's rates and regulations. The company for a number of months has anticipated the investigation, and has had experts at work in the state obtaining a valuation of the company's properties and making investigations of its rates, with the view to justifying itself at the hearing.

## Indiana

The question of who is going to pay the war tax on telephone messages, and if the user is to pay, how he is going to do it, has been submitted to the attorney general by the Indiana Public Service Commission. Commissioner Murphy called attention to the problem when notice was received a charge of 1 cent on each toll message would be placed on all business calls. The war tax bill says the charge shall be made in addition to other charges, which is supposed to imply telephone companies will be permitted to add this to the total of the regular charges. It is expected the attorney general will give his ruling soon, explaining the matter fully.

## Pennsylvania

Expert testimony as to what should constitute a basis for telephone rates was introduced before the Pennsylvania Public Service Commission November 16, by H. F. French, representing the Chamber of Commerce of Pittsburgh, and Assistant City Solicitor Charles K. Robinson, representing the city of Pittsburgh. They placed on the stand Professor E. W. Bemis, who is a member of the advisory board of the Interstate Commerce Commission in the matter of fixing the valuation of interstate railroads, and Dr. Whitten, who was formerly statistician for the Public Service Commission of New York.

These experts do not believe that the replacement value of a plant should be accepted as a basis for rates but seem more inclined to the thought that the cost of the property ought to receive more consideration. They do not think, however, that the replacement feature ought to be entirely disregarded, because the courts have been inclined to that view and it would be useless to disregard the attitude of these tribunals.

These experts were cross-examined by the attorneys for the Bell Telephone Company and it is expected that testimony in rebuttal will be introduced.

## Wisconsin

The Wisconsin Railroad Commission has fixed the rates to be charged for physical connection between the Rock County Telephone system and the Wisconsin Telephone system at Janesville. The charge for one subscriber to use the lines of another system through physical connection was fixed at 5 cents a call; 10 cents for toll service over 50 miles and 15 cents for toll service over 100 miles.

## Ohio

The Bryan Telephone Company of Ohio has asked for the consent and approval of the Ohio State Commission to purchase two hundred and fifteen shares of the common capital stock, at the par value of ten dollars per share, of the Edon Home Telephone Company, of Ohio, the authorized and issued capital stock of which corporation is of a total par value of ten thousand dollars.

The acquisition of this new capital stock will grant the Bryan company a controlling interest.

After hearing the evidence, and it appearing that the service furnished the public will be improved through the acquisition by the Bryan Telephone Company of a controlling interest, and it appearing further that no increase in rates nor diminution of service will result, the commission has granted the purchase.

The Public Utilities Commission of Ohio has authorized the Central District Telephone Company of Ohio to sell the Jefferson and Warren Telephone Company a certain pole line, extending over a distance of approximately four miles from Kinsman, in the county of Trumbull, to a point on the boundary line between Trumbull county and Ashtabula county.

The Jefferson and Warren Telephone Company is authorized to purchase this property and to pay the agreed sum of fifty dollars.

## District of Columbia

The Public Utilities Commission of the District of Columbia has received complaints from subscribers to telephone service furnished by the Chesapeake and Potomac Telephone Company that the company makes the same charge for telephone removal in a case which requires removal of the telephone equipment as in a case which requires no change in equipment on the premises of the subscribers. The rates for service filed by the telephone company with the commission contain the following explanation of the term "removal charge:" "A charge applied under certain conditions for the moving of telephone equipment from one location to another."

At a hearing the telephone company introduced evidence to show that it is the practice of the company in dealing with removals to make no distinction between a case in which an actual removal of equipment on the premises of the subscribers is necessary and a case in which no such removal is necessary; and to show that the cost to the company is not greatly different in the two cases due to the fact that the house wiring and outside connections from the house to the company's lines are not removed, since the cost of removal would be greater than the salvage on the material, and therefore the telephone itself is the only equipment on the subscriber's premises removed in any case; and the company further introduced evidence to show that even in a case in which no removal of telephone equipment on the premises of the subscriber is involved it is necessary to make new connections to the switchboard from the wires as they enter the exchange building, to send a man to the premises to change the number on the telephone, and to make changes not only in the directory itself but also in the records of all the many departments of the company.

The telephone company also showed that the company has adopted the practice of a flat average charge instead of actual charges on the basis that it is more easily administered than actual charges, it relieves the odd subscriber whose installation is made under especially onerous conditions from a heavy charge on one case, and because the plan has been in general use by the company for a number of years and seems to have been approved of in general by the public, and, further, because it would not be possible to classify the many different conditions which would arise and fix a different charge for each one.

The removal charge is made upon change of service rather than change of equipment and the explanation as given in the rates filed with the commission is not phrased so as to define removal charge as the representatives have always understood it.

The commission was of the opinion that the present practice of the Chesapeake and Potomac Telephone Company of charging a flat rate for removals without distinction as to actual removal of telephone equipment on subscriber's premises is just and reasonable. The commission specifically reserves its opinion, however, as to the amount charged for removals. The matter of the amount charged bears a close relation to the question of rates charged for service and will be handled by the commission in connection with such rate cases as may come before it for determination.

## War Affects Bell Revenue

The present war has created a situation for the great Bell telephone system entirely without precedent. It is the first time in the history of this telephone business when a comparative statement of income has not shown some gain over the previous year. At the present time the gross revenues of the Bell system from long distance traffic are 92 per cent of normal. In 1912 a gain of 12 per cent was made in long distance traffic, and only slightly less than that in 1913. This decrease below normal has all come since July 31, and is directly to be laid at the door of the war. When it comes to toll and exchange business of the entire system, traffic is about 95 per cent of normal. This is even more startling than the falling off in long distance receipts, which are obviously a matter of business. Exchange telephone traffic, on the contrary, is a subject which is vitally connected with the daily lives of the people. It is safe to say that no expert would have ever predicted that the exchange traffic of the Bell system would admit of a decrease. This, too, must be laid to causes created by the European upset. The decrease in the income of the local subsidiary system is spotty. In the great Northwest, in Kansas, Nebraska, Iowa and states which have felt the boom of high prices for grains, there is no decrease in business. On the contrary, there is a 5 per cent or 6 per cent increase. But New England and the Middle Atlantic States are showing shrinkages, particularly Pennsylvania, which has been hard hit by the depression in steel, and West Virginia, whose coal business is in the doldrums. The Pacific Coast is also subnormal. The South, for obvious reasons, is showing a decided falling off. This comparative decline in telephone income did not become clearly outlined until about September 1. It has come so late that the full fiscal twelve months to December 31 is almost sure to show some sort of an increase in total income. For the eight months to August 31, for example, the gain in gross was $7,700,000. If the last four months show a decrease of 5 per cent there would still be a small gain at the end of the year of between $3,000,000 and $4,000,000 in total revenues of the Bell system.

## Bell Contests Connection at La Crosse

The Wisconsin Telephone Company is going to contest Wisconsin's physical connection law to the limit.

This was indicated when attorneys for the Bell company filed notice in the Dane county circuit court withdrawing its application to dismiss the suit in the toll cases brought by Attorney Frank Winter on behalf of the La Crosse Telephone Company.

In August the Wisconsin Railroad Commission issued an order for physical connection between the lines of the Wisconsin and La Crosse companies at La Crosse.

The Bell people agreed to comply with the order and requested that the suit against them, brought by Attorney Winter in the Dane county circuit court, be dropped.

Mr. Winter, to secure a ruling on the constitutionality of the law, refused to drop the suit.

The withdrawal of the petition for dismissal indicates that the company will test the constitutionality of the law and will take the case to the highest courts in an effort to have the law declared unconstitutional.

In the meantime La Crosse patrons of either telephone enjoy the use of the toll lines of the other.

"The Gate City of the Sunny South" is a booklet giving the impressions of Adolph M. Schwarz, of Atlanta, Ga. Mr. Schwarz has just opened an office there.

# Of Interest to the Trade

*What the Telephone and Accessory Manufacturers Are Doing to Advance the Art*

## Harmonic Ringing for Generator Call Systems

Many an exchange manager has wished that his generator call offices were equipped for harmonic party line ringing. He would like to free his system of biased ringers with their grounds and ever recurring spring adjustments. But he believes the harmonic system is not well adapted to a magneto office. Harmonic ringing, however, has long passed the experimental stage. Improvements have been made in the vibrating converters so that their installation is entirely feasible in a small office. A large part of the trouble in the early installations was due to the variations of voltage on the converter when operated from primary batteries. The general introduction of power and lighting circuits in the towns of normal size has usually furnished some economical means of charging a storage battery. Small and comparatively inexpensive sets of storage cells with a reasonable amount of attention may be depended upon to maintain a uniform voltage for the converter and insure its successful operation. The storage cells in many offices are also utilized as a source of operators' transmitter current and upon transfer, or other signal circuits.

One defect appeared in the telephone instruments equipped with harmonic ringers which was peculiar to the generator call systems. A party line subscriber, when turning his generator, would at times cause bells of other instruments on his line to tap slightly. The Stromberg-Carlson Telephone Manufacturing Company has successfully obviated this difficulty by equipping its generator call harmonic telephones with a generator of interesting design. Mounted on the end of the armature shaft are two cams, the crest of one set a slight angle in advance of the other. When rotated, first one cam and then another engages a corresponding contact spring. The first cam short-circuits the armature winding, and afterward the second cam connects the armature winding with the line. At the instant the crest of the wave, or maximum voltage, is reached the first cam "breaks" the short circuit on the armature, and as a result a heavy inductive "kick" is delivered to the line. At once the second cam breaks contact between the armature and line. An impulse of such short duration as delivered by this generator will not build up a sympathetic vibration in any harmonic ringer, and is capable of giving a most positive signal at the central office.

A large number of these telephones have been placed in service and proved their merit under severe operating conditions.

## Container for Blue Prints and Tracings

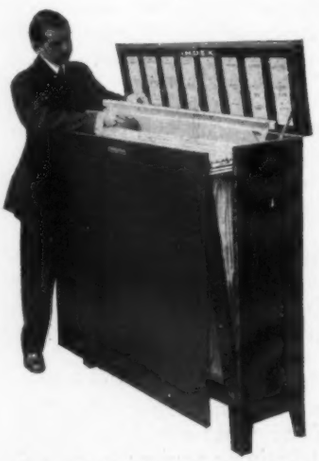
The problem of engineer and draftsman today is not so much indicated by the question, "Where is that blue print?" as by the one, "In what condition will it be a year from now?"

A container, or rather a combination protective container and automatic filing device, has been patented by the Yawman & Erbe Manufacturing Company, Rochester, N. Y., as a solution of this problem, and this file will, no doubt, prove of great interest and value to telephone engineers.

This "Mammoth Vertical File," as the company terms it, occupies when closed, only 4 square feet of floor space, yet it will accommodate from 700 to 1,000 prints.

*Mammoth Vertical File Set for Reference Work. File Open to Receive Point.*

The accompanying illustrations show the file as open to remove a print, and with the front of the cabinet set for reference work. In the first illustration may be noted the compact appearance of the contents. The construction is such that all dust is kept out of the cabinet when closed. The prints are hung vertically in strong manila envelopes and each envelope is numbered. The inside of the cover is arranged with an alphabetical index which, when properly filled out, gives a numerical reference to the location of the print or tracing in its particular folder or envelope.



*Mammoth Vertical File in Position for Filing Blue Prints*

Should it be desired to work on the prints where the workman has, at the end of his fingers, other prints for reference work, it is necessary simply to open up the front of the cabinet. By doing this two supports drop into position, at the same time pushing up two small plugs at the bottom of the now reference table, to prevent the prints from sliding off to the floor.

Altogether this "Y and E" Mammoth Vertical appears to have the practical and economical side of the blue print file question solved. Yawman & Erbe Manufacturing Company has prepared a descriptive booklet on the subject entitled, "The Proper Place for Blue Prints and Drawings," which may be had upon application to the company.

## Kellogg Exhibit At Columbus

Among the manufacturers' exhibit shown at the recent convention at Columbus, the Ohio State Independent Telephone Association, one which received much comment was the Kellogg Switchboard and Supply Company's display. This was unanimously considered the most complete and impressive exhibit the company had ever shown at a two-day convention.

The new automatic recall switchboard recently developed by the Kellogg Company was the center of attraction. During the time it was on display, seven hundred and ninety different demonstrations were made, so it is very evident that this new, wonderfully efficient board was in use constantly. Several parties of operators from out of town and from the local exchange visited the convention particularly to see this board and learn its operation. "Why, all you have to do is get their number and tell them if the line is busy," said one enthusiastic young lady.

The recent standardization of the Kellogg private branch exchange boards is an important development and the cabinet exhibited at the convention received much favorable comment.

One very attractive feature of the Kellogg exhibit was a folding panel display showing standard apparatus, such as induction coils, retardation coils, condensers and the like, also the manufacturing processes of the transmitter back, receiver cup, desk stand, lug showing, for instance, how the Kellogg transmitter back is evolved from a flat disc of metal.

Two large standing panels contained samples of the Kellogg new type magneto and the universal sets, induction coil telephones and all styles of desk stand equipment, including the microtelephone.

Kellogg representatives had many visitors and each portion of the exhibit was viewed with much interest, but the automatic recall board was easily the feature of the day. Instantaneous recall, automatic ringing secret service and its many other advantages were shown under conditions approximating actual service and in a clear, convincing manner.

The Kellogg Company's sign display was a positive departure from the usual tiresome array of cheap, gaudy

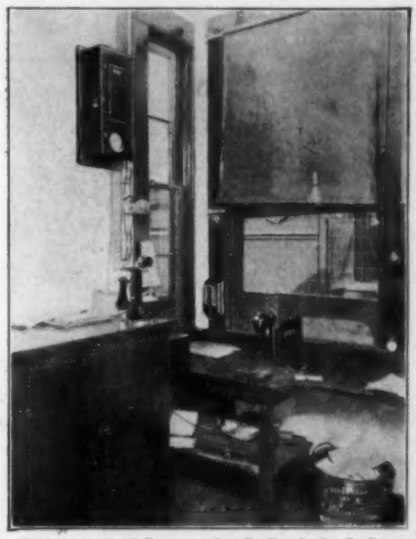
*The Kellogg Exhibit at Columbus.*

cards. Two dozen handsome, well lettered signs were displayed in oak frames specially designed for the purpose.

Those of the Kellogg organization who were present at the convention are: L. D. Kellogg, president; J. B. Edwards, vice-president and general manager; A. J. Carter, general sales manager; H. D. Currier, chief engineer; Ben Woodbury, Ohio repreesntative; Don Gould, Ohio representative; C. D. Boyd, sales engineer; C. M. Thompson, Pennsylvania representative; B. H. Blake, Indiana representative; M. B. Hazak, engineer; E. I. Pratt, advertising manager.

## Telephone Train Dispatching on the C.R.& I.City Ry.

The Iowa Railway & Light Company, which operates the Cedar Rapids & Iowa City Railway, has in successful operation a telephone train dispatching equipment covering the entire line. This railroad runs from



*Dispatcher's Office on the C. R. & I. C. Ry.*

Cedar Rapids south to Iowa City, a distance of approximately thirty miles with a branch going east from Cedar Rapids to Mt. Vernon, a distance of fifteen miles. This includes some of the best farming land in Iowa where traffic is exceedingly heavy. The passenger trains on these lines are operated by electricity and the freight trains by steam.

Ten way (or open) stations are equipped with telephone and selective signaling apparatus. No. 102 selector sets containing the Western Electric No. 50 type selector are used for signaling the way station operators while the No. 1048 type self-contained folding gate telephone arm is used for the operators' talking apparatus. Six way station outfits are installed between Cedar Rapids and Iowa City and two between Cedar Rapids and Mt. Vernon. The power house, the superintendent's office and the shop are also connected with the telephone dispatching circuit. The dispatcher is located two miles south of Cedar Rapids in the shop office building and controls all points on the line.

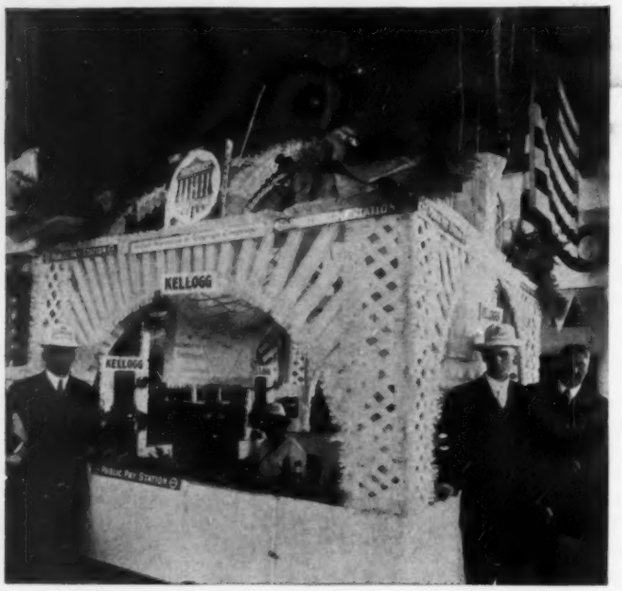
A portable telephone set has been furnished to each train crew so that communication may be had with headquarters at various points along the line. These telephones are fitted with cords and plugs arranged for plugging in pole jacks placed at a convenient height on the telephone poles along the right-of-way. This equipment is especially valuable in emergencies. Nine pole jacks are placed on the Cedar Rapids and Iowa City division and six on the line to Mt. Vernon.

An idea of the traffic on this railway system may be obtained from the fact that thirty-eight passenger trains and four scheduled freights run daily between

5 a. m. and 1 a. m. on the Cedar Rapids & Iowa City branch and eighteen passenger trains and two scheduled freights between 5 a. m. and 12 midnight on the Cedar Rapids & Mt. Vernon branch. The telephone dispatching system has now been in use for some months and excellent results from every point of view, notably economy and efficiency of operation, are reported.

## Telephone Exhibit at a County Fair

A view of the combined exhibit of the United Telephone and Telegraph Company and the Kellogg Switchboard and Supply Company at the Lancaster County




*Kellogg and United Company's Exhibit.*

(Pa.), Fair is shown in the accompanying illustration.

This exhibit was conceded to be the finest on the ground, and led directly to the procuring of several contracts for the operating company and the sale of telephones and switchboards for the manufacturer. The booth was installed under the direction of A. Paul Rohrman, local manager of the United Company, and was designed by J. C. Henderson, solicitor of the company. "There were over 100,000 visitors to the fair," said C. N. Thompson, of the Kellogg Company, "and we gave out 10,000 pieces of advertising matter."

Telephones were installed in the various buildings and departments, the grand stand, judges stand, hospital, etc. The telephone company gave free service to all subscribers in the county.

## Book on Motorcycles

Motorcycles, Sidecars and Cyclecars, by Victor W. Page. $1.50. Norman W. Henley Publishing Co., New York.

It is the aim of the author in this work to bring before the motorcycle novice a comprehensive and non-technical treatise on the construction, operation and repair of motorcycles and all forms of lighter self-propelled vehicles. He has been fortunate in securing the co-operation of the leading American and European manufacturers and, as a result, the book contains over 350 illustrations, for the most part reproduced from engineering drawings and photographs. Many points are brought out regarding the construction that every operator should know, and that otherwise could only be obtained by dismantling the machine.

The operation of the machine, which is usually a "bugbear" to the novice, is thoroughly taken care of for all classes of machines. In order to make operation more easy, a chart has been prepared showing all parts of the machine and the functions of each. At the same time the chart serves a ready means of locating any trouble that is causing faulty operation.

A great deal of time is spent by a motorcycle in the repair shop for small irregularities which could be attended to by the novice, had he the instructions. The author has treated this subject in such a simple manner that, with his aid, the majority of all motorcycle trouble can be easily remedied after a study of the book.

## New Company Organizes in Southwest

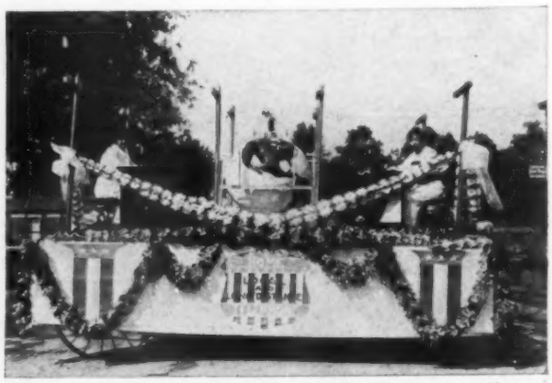
The Sabine Citizens' Telephone Company has recently been organized to give telephone service in Sabine county, in the eastern part of Texas, with headquarters at Hemphill. The new company has taken over two small exchanges formerly operated by another company and in addition will install five Western Electric switchboards at other centers.

Of these, two are to be of the No. 1800 sectional unit type—one with a present equipment of 20 miles and the other of 15 lines. One No. 1200 magneto switchboard with self-restoring line signals equipped for 30 lines and two No. 1220 switchboards of the same type equipped for 50 and 75 lines, respectively, have also been ordered.

These central offices will operate over 200 lines as a beginning.

## An Attractive Float

The Home Telephone Company, Chillicothe, Ohio, under direction of H. M. Elliott, general manager, with the assistance of Charles H. Duncan, wire chief, and E. O. Jackson, superintendent of construction, furnished



*The Kellogg Float at Chillicothe.*

for the Farmers' Fall Festival opening parade on Monday evening, September 21, probably the most attractive float in the pageant. The design was particularly unique in that the idea was to convey to the public the long distance facilities of the Home company. The horses drawing the float carried signs "Home telephones kill distance and bring neighbors nearer."

Miss Florence Ritter and Miss Agnes Ryan, operators for the Home company, added, of course, to the attractiveness of this feature of the pageant.

Kellogg telephones were used on the float.

## Toll Switchboard For Tampa

The Peninsular Telephone Company has placed an order with the Western Electric Company for a complete toll switchboard equipment to be used in the new Tampa central office building, now in the course of erection in the business section of that Florida city. The toll equipment is to be arranged for operating in connection with the automatic city or local lines, and is to consist of a toll switchboard, chief operator's desk, information desk, and the necessary frame and rack.

The toll switchboard is to be made up of three 5-panel, 2-position sections finished in mission style. Of the six positions, the first will be the recording position, the second, the pay station position, and the third, fourth and fifth the terminating toll and rural positions. The sixth position will be blank. The capacity of the present equipment will be 100 pay station lines, 60 toll lines, 40 rural lines, 30 recording trunks and 10 inter-position trunks.

*The Tampa Toll Board.*

Magneto, rural and toll line circuits will be of the ring-up locking relay type arranged with multiple and answering jacks. The pay station line circuits will be of the central battery type arranged to operate with regular central battery telephones and are to be multiplied throughout the switchboard. Two types of cord circuits, universal and toll, will be supplied. The universal cord circuits will be arranged with double lamp supervision, and will automatically adapt themselves to the lines with which they are used without any need of discrimination on the part of the operator. The through toll cord circuits are to be of the high efficiency type with lamp supervision and especially designed for magneto toll to toll connections.

A special feature of the equipment will be found in the service trunks which are to be arranged for completing connections from toll or rural lines direct to local subscribers. Talking pairs between the toll board and the subscribers are provided by means of special connectors. This will have the effect of speeding up the toll service as it eliminates the necessity for putting the incoming toll calls through the local switchboard. It will also reduce the cost of operation per line per day, an important factor in telephone management. In addition to this feature, a multiple of the lines of certain heavy toll users will be carried through the toll board. No special connectors are required, however, as it will be unnecessary for the toll operator to select the line desired, the circuit being permanently connected to the proper line. She need only plug into the proper jack and ring direct with her cord circuit ringing keys.

Overflow lines are also provided so that connections can be made to local subscribers through the regular automatic apparatus in case of a sudden rush of business, too great to be handled in the regular way.

A two-position chief operator's desk and a two-position information desk are to be provided for use in connection with the toll switchboard equipment. The intermediate distributing frame and the relay rack will both be of the unit floor type, and so designed that additions may be readily made when desired.

It is planned to cut the new equipment into service in the spring of 1915. The new equipment will give Tampa, and in fact the entire district covered by the Peninsular Telephone Company, the best kind of toll service that can be supplied by equipment which embodies the latest developments in telephone art and practice.

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## Improved Clamp for Wire or Cable

Mathias Klein & Sons, tool manufacturers, Chicago, have perfected and are now marketing an improved Klein Haven's clamp adapted for handling plain or stranded wire or cables up to ¾ inch in diameter.

The particular feature of construction is the addition of a swing latch which engages with stud on the lower jaw, this centralizing the pressure on the cross-bolt, which

*The New Klein Clamp.*

is strongly made of turned machined steel. The body and handle of this clamp are made of steel forging and the eccentric of hardened tool steel.

This tool is the outgrowth of a demand for a clamp to accommodate larger than ½-inch cable.

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## Detecting the Eavesdropper

Telephoning isn't what it was. It won't even be what it is very long, if the inventors keep on, says the *Philadelphia Ledger*. One of them has spent 11 years on the misanthropic job of turning out an attachment to detect the third party who cuts in to listen to a little gossip. With 9,000,000 party lines in use in the United States, the misery likely to be caused by this single invention is appalling. Worse still, the same mechanism may be set to cut off a conversation at the end of a certan number of minutes. And do any of us want the "seeing-by-wire" atachment that another of these busybodies has invented? Imagine the embarrassment of the five-foot man with the timid eyes who prefers to blow up the coal company over the phone! Contemplate the confusion of milady who likes to chat with her friends in boudoir negligee! How will busy husband at the club be able to "pull" the old, old bluff of "detained at the office?" The inventors had better curb their passionate genius.

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A neat little pocket booklet, 3½ by 4½ inches in size, is entitled, "This Is About the Keystone Telephone." It gives in condensed form all the important and interesting facts about the Keystone independent telephone system of Philadelphia.

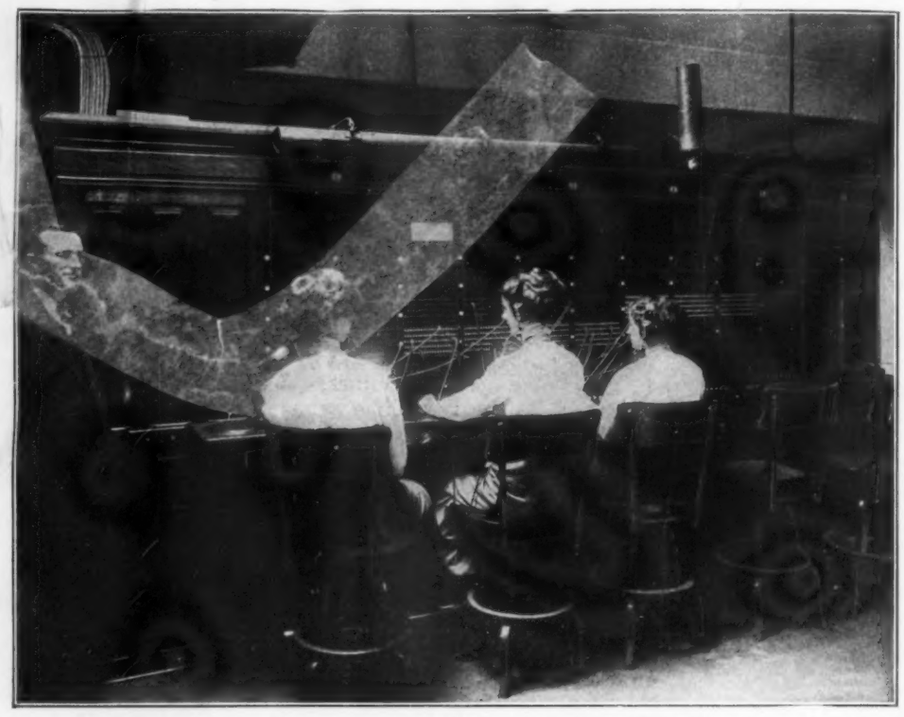
## Kellogg Board At Harlan, Mo.

The Harlan and Avoca Telephone Company has purchased a new Kellogg universal associated multiple switchboard. This board was awarded after most careful consideration and investigation. It is similar in type to the Kellogg installations at Traer, Iowa; Nevada, Iowa; Aurora, Neb.; Fall City, Neb., and Lamoine, Iowa.

This splendid new equipment will be a duplicate of the many very successful Kellogg installations of the universal multiple type, having line lamp signals associated with the multiple jacks.

The cabinet will be of the usual heavy quarter-sawed oak finish, with complete equipment including a box panel, a main distributing frame, relay and power plant. It is a two-section, three-position board with a present and ultimate capacity for 1,200 universal lines. A chief operator's desk of the sanitary style, key type circuits, no cords or plugs being necessary, is also included.

The Harlan Company is to be congratulated upon the possession of equipment having the record that this type of switchboard has to its credit whenever given the opportunity to prove its merits, which it has done in a number of installations.



*Gives an Idea of What the Harlan Equipment Will Look Like, Installed. This View of the Chaton, Missouri, Universal Board*

This fact was graphically illustrated by a communication received by the Kellogg Company, referring to the greatly improved service of an exchange having just installed a complete new Kellogg equipment, and stating that there were such instantaneous replies to calls that subscribers were startled; the operator's voice came over the wire before the receiver was at the subscriber's ear.

Such a record is indeed an innovation to people accustomed to the indifferent and out-of-date service now to be had in many towns served by switchboards of the old-fashioned types.

The Harlan & Avoca Company is one of the most up-to-date exchanges in the state. It appreciates the economy of buying a switchboard that assures the best and the most economical service. The officers of the company are: J. H. Jenks, president, and M. Fretz, secretary and manager.

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## Must Have Franchise in Tacoma

Making it necesary that the Sunset Telephone & Telegraph Company go before the Tacoma city council within four months and obtain a new franchise to continue in business, Superior Judge Card has sustained the contention of the city of Tacoma that the Sunset company cannot operate under the franchise of the Home Telephone Company of Puget Sound. Judge Card's decision was made on a law basis on the demurrer of the city to the defense of the telephone company. The Sunset company contended that its purchase of the franchise and assets of the defunct Home company gave it the right to operate under the franchise granted the Home company, which has 16 years to run. The present franchise of the Sunset company expires March 9, 1915.

It is understood that the city will require new and more liberal conditions in the next franchise. A tentative franchise taken up about two years ago provided that the Sunset company must turn over to the city 2 per cent of its gross earnings.

Judge Card holds that the city council had the right to pass the ordinance forfeiting the franchise because of the failure to maintain an automatic system, and even more important, because the original franchise granted the telephone company provided that the franchise should not be sold or assigned to any competitive telephone company then doing business in Tacoma. It was conceded by both sides in the case that the Sunset company was a competitive company at the time the franchise was granted.

The court held, however, that the decision affected the franchise only, and did not alter the legality of the purchase by the Sunset company of the physical assets of the Home company, such as buildings, lines, wires and other properties.

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## The Insistent Telephone

There is nothing in the sound of the shrill little bell to warn us of the import of its message. More's the pity. It may be that bore whose telephone conversation begins: "Well, what do you know today?" It may be your lawyer to say you've inherited a million. Hence the arrogance of the instrument. It knows its voice will never willfully go unanswered so long as the element of chance lies concealed within it.—*The American Magazine.*

## Kellogg Equipment for Hillsboro, Ohio

The Hillsboro Telephone Company, of Hillsboro, Ohio, has purchased a new central office equipment to replace its old four position common battery switchboard. The new equipment will consist of an eight-panel, three-operator position multiple section having an ultimate capacity of 1,200 common battery lines with a present installation of 440 common battery lines and 30 rural lines. The common battery lines will have multiple lamp signals and be available for answering by any operator.

The two subscribers' positions are to be arranged with cord circuits which have no listening keys, the operator's telephone set being connected for answering by the insertion of the answering cord and disconnected by the insertion of the calling cord, providing automatic listening, four-party harmonic automatic ringing, automatic peg count, secret service, instantaneous disconnect and instantaneous recall.

On the rural lines it will not be necessary for the operator to discriminate between the uses of the different cords, as they are automatically adapted to the classes of service to which they are connected.

This makes team work possible, for the rural operator can answer and connect common battery lines with the same advantages obtained in the regular cord circuits. These cord circuits are to be arranged with a listening key and can be used to listen in only on rural connections.

*New Eight-Panel Kellogg Equipment at Hillsboro.*

This equipment will be installed by the Kellogg Switchboard and Supply Company.

## The Dry Battery

The Nungesser Carbon and Battery Company, Cleveland, Ohio, sends us the following clever piece of copy, which it has copyrighted:

THE DRY BATTERY.
*(A Symposium.)*

I am the little giant among the powers.

My purpose is to serve man.

I am the result of patient effort, intelligent study and high purpose.

I was born in the laboratory and am the child of Science.

I have enabled man to fly; I made it possible for him to speak across the gulf of space; I protect him from danger; I keep the burglar away at night; I bring ease and I am uncomplaining.

When man is ill I summon his physician; when he is in haste I serve as his messenger; when he sleeps I remain on duty.

I flash a million beams of cheery light into dark places.

I am never in the way. I require no petting, no coaxing no urging.

I do my duty and am content to be obscure.

I ask for no elaborate quarters. In a little corner upon a dark shelf I wait, willing always to respond to my master's demands.

My sphere of action is not limited. For the farmer I dig and saw and pump; I serve the merchant in a hundred ways; to the banker and the man in the office I lend constant assistance; I minister to the convenience of the ladies. I never ask for a vacation.

I am the greatest little helper on earth.

Within my narrow cell the most potent combination of the primordial elements is accomplished.

On land and sea and in the air and under the ground my usefulness is demonstrated.

I am one of the greatest aids to human progress.

I am a worker of miracles.

I am the Acme of condensed utility.

I am the dry battery.

## Uniform Bookkeeping Fixed

A uniform accounting system for Class C telephone companies—those doing an annual business of from $10,000 to $50,000—has been prescribed by the Interstate Commerce Commission. The new system goes into effect on January 1. The commission pointed out that, although the lines of a company may be entirely within one state, if it handles interstate messages for long distance companies on a commission basis or otherwise it is subject to the act to regulate commerce.

The notice to the companies, accompanying the outline of the new system, states:

> Accounting officers are invited to correspond with this office should question arise with regard to the correct interpretation of any account or rule prescribed in the system of accounts, in order that uniformity may be secured in the application of its provisions.
>
> As an aid to the smaller telephone companies in the keeping of their accounts, there is contained in the appendix a bookkeeping system for small telephone companies. This form of bookkeeping is suggestive only, and it is not required that the companies make use of it either in whole or in part. The companies may for the present adopt any bookkeeping system they desire, so long as the one adopted will produce the results required by the system of accounts herein prescribed.

## Klein's Christmas Gifts

"Christmas Gift Suggestions" is the title of a very neat booklet just published by Mathias Klein & Sons, Chicago, which will be sent to any reader desiring it. A picture of the booklet appears in the company's advertisement in this number, which should be read by anyone who contemplates making a Christmas gift to a telephone man. A remembrance of this kind, that will help the recipient to do better and consequently gain greater reward, surely shows the Christmas spirit in the greatest possible degree.

## Kellogg Exhibits at Texas Convention

Many Texas telephone men were visitors to the interesting exhibit of the Kellogg Switchboard & Supply Company at the recent Texas convention at Waco. The exhibit, which included a folding demonstration panel containing the company's complete line of apparatus parts, was in charge of John A. Stratton, state representative, and A. J. Carter, sales manager.

# Brevities of the Business

## *The Activities of the Whole Telephone Field Told in Short Paragraphs*

*PERSONAL NOTES.*

Kempster B. Miller, who is too well known to the telephone field to need identification, has been appointed chief engineer for the receivers of the Central Union Telephone Company. Mr. Miller will devote such of his time to this work as it may require. He is a graduate in electrical engineering of Cornell University, class of 1893, and for two years following his graduation was employed as assistant examiner in the electrical division of the United States Patent Office at Washington. From 1896 to 1898 he was chief electrician for the Western Telephone Construction Company at Chicago. He then became engineer for the Kellogg Switchboard and Supply Company. Since 1904 he has been practicing as a consulting engineer under the firm name of McMeer and Miller. This firm has become very widely known in independent telephone circles. Mr. Miller is the author of several text books on telephony and telegraphy, and is a member of the American Institute of Electrical Engineers, American Society for the Advancement of Science, Engineers' Club of New York, the Union League Club, the Quadrangle and City clubs of Chicago.

John A. Campbell, recently appointed to the Kellogg Switchboard and Supply Company's Indiana territory to assist Mr. Blake, has had a long and varied experience in the telephone field. Mr. Campbell was born thirty-two years ago near Winimac, Indiana, and attended the schools in that vicinity, graduating from the Winimac high school in 1903. He then started to work for the Winimac Telephone Company and spent six years in different branches of service, later filling the position of general manager of the Winona Telephone Company at Winimac. He was then transferred to Plymouth, Indiana, where he worked in all capacities and at the time of his resignation to join the Kellogg sales force, he, as assistant manager, was doing important work for this exchange. Mr. Campbell is especially interested in line construction work and also switchboard detail. The first he enjoys because it takes him out in the open, while switchboard work presents technical problems which he, with true artist's pride, takes decided interest in working out. He has installed and done all the trouble work on seven exchanges of the Winona Telephone System, and recently he moved the exchange at Kewanee and installed the board and arrester equipment. Mr. Campbell is married and has three children. His headquarters will be in Plymouth, Indiana.

C. V. Huffman, chief clerk to Robert G. Porter, district manager of the Missouri and Kansas Telephone Company, at Springfield, Mo., has been made manager of the company's exchange at Monett, succeeding J. H. Dunlap. A. B. Seath, of Joplin, succeeds Mr. Huffman.

R. L. Burgess, formerly in charge of the Deming office of the Mountain States Telephone Company, has succeeded R. E. Pilloud as district manager in Tucson, Ariz. Mr. Pilloud has been transferred to Lamar, Colo.

"The greatest opportunities in my life have been in the associations with and acquaintances of the telephone men of this country." This is the live saying of a live telephone man, Frank Eldridge, on the day of his new association with the Kellogg Switchboard & Supply Company. Cheerfulness, optimism and the appreciation of intercourse with his fellowmen are the prime reasons for the success of this young man. He says so himself, and his very brief, yet interesting, advance in the business world in a few years bears out the statement. Mr. Eldridge was born at Wolcott, Ind., June 23, 1883. When he was ten years old he left his home town for Chicago, the "Windy City," and has been there ever since. In 1902 he started out for the Santa Fe on engineering work. In 1903 he accepted a position with the Chicago Telephone Company in the collection department, where he remained four years. He next was employed in the operating department of the American Telephone & Telegraph Company as special agent, handling adjustments and disputed toll charges. This Mr. Eldridge took care of to the satisfaction of his superiors for over two years. He was then made service inspector, taking care of transmission tests and special work for the operating and commercial department. It was in 1908 that Mr. Eldridge claims he was afforded the opportunity of his lifetime, for the study and appreciation of human characteristics—coming in contact with the big men of the political world at the National Republican Convention, where he worked day and night as representative of the American Telephone & Telegraph Company. In January, 1912, Mr. Eldridge left the A. T. & T. Co., taking a position as special agent in charge of the long distance service for the Illinois Tunnel Company, which he represented successfully at the National Republican Convention of that year. In October, 1913, when, as Eldridge says, "the fuse blew" he was appointed secretary of the Central States Telephone Service Association, which later became the service department of the Independent Telephone Association of America. His work for this organization is well known, resulting for him in an extremely wide acquaintance in the telephone field. In his new connection Mr. Eldridge will boost for Kellogg equipment just as enthusiastically as he promoted the interests of the Service department. His many friends and acquaintances will not be forgotten, as he intends to "look them up" whenever opportunity is afforded. In 1903 Mr. Eldridge was married to Miss Elizabeth Nies of Chicago. Their home is in Ravenswood, a Chicago suburb, where they have a fine family of three girls and a boy.

Percy Smith, wire chief for the Bell Telephone Company, at Ashland, Wis., has resigned and is succeeded by Warren Tweedy, of Eau Claire.

W. A. Jennings, cashier of the Raleigh, N. C., district of the Southern Bell Telephone & Telegraph Company, has been appointed district manager, to succeed A. M. Huggins, resigned. Mr. Jennings holds the distinction of being the youngest manager in the southern district.

R. A. Wylie, district commercial manager of the Lincoln Telephone and Telegraph Company, at Hastings, Neb., has been appointed special agent for that company with headquarters at Lincoln. Mr. Wylie will be succeeded by W. R. Johnson, now district traffic chief.

General Thomas Sherwin, chairman of the board of directors of the New England Telephone & Telegraph Company, Boston, Massachusetts, suffering from hemorrhage of the brain, is reported somewhat improved.

Benjamin F. Lloyd, an old-time telephone man, died at his home, 109 Hutchinson avenue, Edgewood, Pa., November 8.

At one time Mr. Lloyd was manager of the Pittsburgh office of the Western Union Telegraph Company, and later was elected a director of the Central District and Printing Company. He also served as Ohio state superintendent for the Central Union Telephone Company.

H. H. Gay, district plant chief for the Nebraska Telephone Company, at Grand Island, has left for his home in Provo, Utah, where he will take a vacation, after which he will then be assigned to a new location.

C. E. Wilde, district manager of the Michigan Telephone Company, at Grand Rapids, Mich., observed the thirtieth anniversary in the service of the company, November 13.

Frank L. Beam, of Mt. Vernon, has been elected president of the Ohio Independent Telephone Association by the directors. This is the eleventh year that Mr. Beam has headed the association.

While walking from the Casino to his automobile while in Norfolk, Va., Theodore N. Vail, president of the Bell Telephone Company, fell and sustained a wrenched knee.

R. E. Belt, of Des Moines, Iowa, has been made manager of the Greenfield exchange of the Iowa Telephone Company, succeeding A. C. Miller, resigned.

B. F. Arnold, of Hot Springs, Ark., has succeeded L. A. Hooper as manager of the Searcy exchange of the Southwestern Telephone Company.

Manager Barnett, of the Independent Telephone Company, at Belton, Texas, met with a serious accident recently when he fell about forty feet from a cross bar on a pole upon which he was working.

Theodore N. Vail was re-elected president of the Society of Telephone Pioneers of America, in convention at Richmond, Va.

C. A. Currie, manager of the Alliance, Neb., exchange, has been promoted to the position of district special agent, with headquarters at Grand Island, assisting F. A. May, district commercial manager. The change is to become effective December 1.

W. O. Parks, until recently connected with the Western Electric Company, of Chicago, has accepted a position with the Chariton Telephone Company, of Iowa, as local commercial manager. The appointment became effective November 15.

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## *NEWS FROM THE FIELD.*

### ALABAMA.

A special telephone for receiving and answering inquiries regarding the parcel post service will be installed in the postoffice at Montgomery.

### ARKANSAS.

The Southwestern Telephone Company is installing a new plant at Hamburg.

### CALIFORNIA.

Arrangements are being made by the Pacific States Telephone and Telegraph Company to expend about $22,000 in improving the facilities of the plant at Alameda.

### FLORIDA.

The Home Telephone Company, independent automatic, has moved into its new exchange building on East Adams street, Jacksonville, where the offices of the company are now among the most handsome and complete in the city.

### GEORGIA.

The handsome new building and plant of the Southern Bell Telephone & Telegraph Company in Valdosta was formally opened October 28. Open house was maintained and hundreds of visitors were entertained with music and refreshments. The structure is three stories with basement.

Plans for the installation of an additional subexchange for the Atlanta Telephone and Telegraph Company have been practically completed, and actual work on the new exchange will begin within thirty days, according to A. B. Conklin, manager of the company, who just returned from the east where he placed the matter before the board of directors of the Atlanta company. The new exchange will be the third established in the past eighteen months.

District plant accounting offices of the Southern Bell Telephone and Telegraph Company have been consolidated in Savannah, where the division plant accounting department has been established in charge of a Mr. Caldwell, who was transferred from New Orleans. The change was effective November 1.

### ILLINOIS.

The Farmers' Telephone Company at Earlville is rebuilding its lines in Amboy, changing them from overhead to underground cables.

Granville Telephone Company, Granville; capital stock, $1,000; telephone system and exchange. H. L. Dysart, Sidney Whitaker and W. E. Hawthorne.

Preliminary work has been begun by the Canton Home Telephone Company for the removal of its exchange office into its handsome new fire-proof building in North Main street. When the company is finally located in its new quarters it will have one of the finest and best equipped telephone exchanges in the state.

The Interstate Telephone and Telegraph Company's franchise right to do business in Geneva was repealed by the city council November 4.

Washington City Rural Telephone Company, Washington; dissolved.

The Bureau County Independent Telephone Company has been granted a twenty-year franchise by the city council.

The franchise of the Inter State Telephone Company, Dundee, has been revoked by the Geneva city council.

F. W. Kelly, manager of the Central Union Telephone Company, has stated that by December 15 all of the construction work of the company will be completed. The erecting of new poles and wires between Galesburg and Princeton is about finished.

The American Telephone and Telegraph Company has issued notice to holders of common stock of Pacific Telephone and Telegraph Company offering to exchange American Telephone and Telegraph stock for common stock of Pacific Company on basis of two shares of American Telephone and Telegraph stock for nine shares of the Pacific Company's common stock. The offer holds until December 15. American stock in exchange will be delivered on or before December 31, 1914, and will carry the current quarter dividend, payable January 15, 1915.

Colfax Telephone Company, Chicago; dissolved.

La Motte Co-operative Telephone Company, Palestine; $4,500; mutual and co-operative telephone service. G. L. Wenner, J. G. Nelson, Ed. S. Fry; corres., Ed. S. Fry, Palestine.

### INDIANA.

The work of getting ready to install the new common battery switchboard at the Greenfield telephone exchange is progressing rapidly.

Churubusco Telephone Company, Churubusco; capital, $25,000; to operate and maintain a telephone plant; directors, H. W. Soest, A. Bush, R. R. Scott.

The Home Telephone Company, Elkhart, is moving into its $75,000 building. It is equipped with the most modern switchboard facilities. The building, which is waterproof and fireproof, has, in addition to the offices and operating rooms, a restroom and a kitchen for the use of the women employes.

### IOWA.

The Springville Telephone Company has completed the work of putting in new poles and wires.

The work of putting 21,000 feet of underground duct has just been completed by the Independent Mutual Company in Shenandoah.

Articles of incorporation of the Bangor Telephone Company, which has taken over the business of the Bangor Rural Telephone Association, have been filed in the office of the county recorder. Capital, $10,000, with shares of a par value of $25. One share of stock is to be issued to each member of the Bangor Mutual Telephone Association who is in good standing. The officers of the corporation are: President, M. H. Green; vice-president, D. C. Norman; secretary, Harry F. Hollingsworth; treasurer, J. W. Macy. They and the following are the directors: C. G. Norman, L. R. Green, H. J. Whitehead, J. A. Speer, D. L. Stanfield and Lyle K. Cole.

Eden township has given an order to the DeWitt Telephone Company to establish a telephone in each of the District Schools of that township.

### KANSAS.

Kansas Mutual Telephone Company, Kansas; capital stock, $2,500; telephone business. E. W. Hall, Curtis Pinnell and R. A. Wilhoit.

H. E. McIntire has been granted permission by the public utilities commission to purchase and run the Fall River Telephone Company exchange and lines at New Albany.

### KENTUCKY.

The controversy over whether or not the Christian-Todd Telephone Company should buy a franchise giving them the right to operate in Christian county outside of incorporated towns, has been settled by that company buying a twenty-year franchise, which was sold before the court house at Hopkinsville.

Enterprise Telephone Company, Edna; capital, $300; incorporators, J. W. Harper, L. F. Harper and Charles Reed.

Buckhorn Telephone Company, Buckhorn; capital, $1,500. Incorporators: Jerry Gross, Alfred McIntosh, W. M. Amis and Ed Amis.

MEXICO.

The directors of the Mexican Telephone and Telegraph Company have decided to omit the dividend usually paid in November as a result of the unsettled condition prevailing in Mexico.

MICHIGAN.

The Citizens' Telephone Company is now installing the largest private telephone system it has ever had the opportunity to put in—the private system in the new Pantlind hotel, Grand Rapids. There will be one 'phone in every one of the 500 rooms in the hotel.

MINNEAPOLIS.

Permit for the erection of a $25,000 branch telephone exchange building, at 4701 Beard avenue south, Minneapolis, has been issued to the Northwestern Telephone Exchange Company. The structure will be brick, two stories high and will be completed by March 1.

MISSOURI.

The Home Telephone Company of Galena has made it possible for its subscribers to communicate with any point where the Bell company operates.

A license to do business in Missouri as a foreign corporation has been issued to the Stromberg-Carlson Telephone Manufacturing Company, which is organized under the laws of the state of New York and has a capital stock of $450,000. The company will utilize $20,000 of its capital in its business in this state, with headquarters in Kansas City.

MISSISSIPPI.

The telephone exchange at Paden was destroyed recently by fire.

The Bell Telephone Company are rebuilding their lines between Hamburg and Watson.

MONTANA.

The new copper wire toll line of the Mountain States Telephone Company has been completed between Livingston and Clyde Park and Wilsall.

Malta will soon have a new telephone office building. The More Telephone Company of Glasgow, which operates the local system, is building a reinforced concrete structure on Sixth avenue and Cosner street, and expect to move their offices to the new one in about a month. An up-to-date switchboard will be installed, greatly improving the telephone service in Malta.

The Mountain States Telephone Company is installing a new switchboard in its exchange at Butte. It will require about four months' time to install the switchboard and equipment.

A network of rural telephone lines, which will be one of the most extensive farmer systems in the state, is being installed in the Lake Basin country north of Columbus and Park City. The estimated cost of the system when completed throughout the basin will be about $10,000.

NEW YORK.

October 30 the physical consolidation of the New York and Commercial Telephone Companies was effected without the least interference of the working system and the long-waited one-'phone system in Troy is a reality. The change affects the cities of Troy, Watervliet, Cohoes and Waterford.

NORTH DAKOTA.

The telephone company at Brinsmade has begun the erection of an exchange building at that place.

The Fingal telephone exchange has changed hands. Pete Krogstad, of Valley City, is the new owner, the amount involved being $7,000.

The Mitchell telephone system from Voss, Veseleyville and other points has been changed from the Tri-State to the Northwestern systems.

The telephone exchange, which is being installed at Leipzig, is nearly completed.

Arrangements have been made for the extension of the lines of the Farmers' Telephone Company into St. John.

The Oliver-Mercer Telephone Company has its lines into Center and Fort Clark and will soon have them strung into Stanton.

OHIO.

Joint application to the state utilities commission has been made by the Brownsville Farmers' Telephone Company and the Newark Telephone Company, asking for consent to lease the property of the first named concern to the Newark company for a period of 99 years.

Right and privileges to operate in Findlay for ten years has been granted to the Central Union Telephone Company in the ordinance which was passed by the city council November 9. The company is also required to place its lines in proper conduits underground in the business part of the city as far as it is practical.

OKLAHOMA.

The Standing Rock Rural Telephone Company of Standing Rock. Capital stock, $1,000. Incorporators: W. T. Smith, F. A. Bryant, F. M. Clark of Standing Rock.

Ringling is to have a telephone system. A new brick office building has been erected and the wires are being strung.

The Pioneer Telephone Company is removing the poles and cables from East Second street, Tulsa, and placing the wires underground.

The corporation commission has granted the Pioneer Telephone Company a continuance until December 8 to submit certain facts and evidence on its application to continue in effect the present rates for service in Oklahoma City. The present rates were installed in violation of an order of the commission and the company is now seeking to validate the increase. The case was to have been heard before the commission November 10.

OREGON.

The state railroad commission has granted permission to the Pacific Telephone and Telegraph Company to discontinue its station at Unity Bridge, in Lane county. The station was not self-sustaining, and its patrons can be served by other lines of the company, according to the commission.

The proceeds of the annual dinner given by the employes of the Home Telephone Company of Portland has been forwarded to King Albert for the aid of the Belgian people.

The Home Telephone Company has completed its new concrete exchange building on the corner of East Forty-third and East Madison streets, Portland.

PENNSYLVANIA.

Home Telephone Company, Sheffield, capital $10,000.

The wires of the Bell Telephone Company, in West Chester, are being placed underground.

Telephone exchanges (alterations), 54th and Woodland avenue and 52nd and Lancaster avenue, Philadelphia. To F. W. Van Loon. For Bell Telephone Company. Private plans.

A. S. Harless, owner of the Harless Telephone Lines, has made many improvements on the Blacksburg-Long Shop line and has obtained permission from the supervisors to erect a new telephone line from Shellsville to Christiansburg, by way of Price and Blacksburg.

TENNESSEE.

The exchange board of the Cumberland Telephone & Telegraph Company, in Athens, is being remodeled and repaired. A number of new drops are being added and other improvements that will add to the betterment of the service.

TEXAS.

The Culebra and Potranco Telephone Company, San Antonio; capital stock, $2,240. Incorporators: Jeff S. Ellison, Theo. Tezel, William Weilbacher.

Jack Newson recently sold to J. G. Reininger his interest in the Marathon Telephone Company, Alpine, for $1,500.

Miami Telephone Company, Miami; capital stock, $800. Incorporators: B. F. Talley, Frank Rasor and A. B. McAfee.

West Texas Telephone Company, Brownwood, loss by fire to cable, telephones and lines, $150.

The Bryan telephone exchange has been sold by H. C. Robinson, owner of practically all the stock, to Mr. Branch, of San Antonio, and the new proprietor has taken charge of the business. The exchange is one of the most up to date and modern in the state.

A petition is being circulated at Ennis asking the City Commission to use its best efforts toward effecting a consolidation of the two telephone exchanges in this city, the Southwestern and the Independent.

A recent fire destroyed the Central Telephone Company, in Gatesville, owned by the Gulf State concern, with headquarters at Tyler, total loss, including books and records; figures not obtained; no insurance. Sam Lindsay of Tyler is head of the company.

The Southwestern Telegraph & Telephone Company, of Beaumont has acquired a lot at Main and Liberty streets, and will shortly erect a modern telephone building, costing $80,000.

WEST VIRGINIA.

The annual meeting of the stockholders of the Farmers' Mutual Telephone Company, continued from October 3, was held November 14 in the Board of trade rooms in the Mercantile Bank building, Moundsville. The meeting was largely attended and the directors organized by electing the following officers: R. G. Dakan, president; J. T. McGreary, secretary; J. J. Lutes, treasurer; Wilbur Jones, Lewis Scherrick, S. T. Richmond and J. J. Cain, executive board.

Ind.

# TELEPHONE ENGINEER

*Volume XII* *CHICAGO, DECEMBER, 1914* *Number 6*

Engineering Library
DEC 2 - 1914


## So Uniformly Efficient

That telephone engineers in all parts of the world are scrapping manual equipment to install it.

## Operating Cost So Low

That the saving more than justifies the expense of its adoption.

## Service So Satisfactory

That patrons give it their overwhelming preference whenever they have a choice.

*These are a few of the advantages of the*

## AUTOMATIC TELEPHONE

*We can demonstrate many others.*

AUTOMATIC ELECTRIC COMPANY
CHICAGO

# What Are You Getting for Your Money?

| | 6 in. Size | 8 in. Size |
|---|---|---|
| Other Anchors Expanded ..... | 11 inches..... | 15 inches (2 ways only) |
| Oshkosh Anchors Expanded..... | 16½ inches..... | 22 inches (4 ways) |

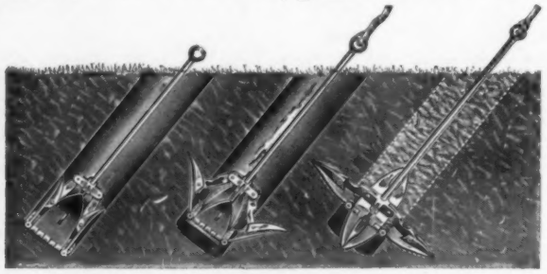

Fig. 1 Fig. 2 Fig. 3

¶ Every OSHKOSH ANCHOR sold has over 50% greater holding surface than any other type on the market.

¶ This means greater holding power against strains, greater line insurance, less trouble, less dissatisfied subscribers, greater moral support from your community, less expense, greater dividends.

¶ We are so sure you will want OSHKOSH ANCHORS that we will gamble a little with you. Send a trial order for a dozen, try them under the hardest conditions, if you don't like them for any reason, or if you can beat them on price per efficiency, send them back at our expense.

**OSHKOSH MFG. CO., So. Main Street, Oshkosh, Wis.**

## A TELEPHONE MESSAGE

We have furnished rubber covered telephone wire to the leading telephone companies for twenty-five years.

## EXPERIENCE COUNTS

## SIMPLEX WIRE & CABLE Co

MANUFACTURERS

201 DEVONSHIRE ST. BOSTON

CHICAGO SAN FRANCISCO

**Before buying cables**

ask for prices on STANDARD cables. They stand for over 30 years of experience in the manufacture of high grade telephone cables. *Write our nearest office*

**Standard Underground Cable Co.**

**Pittsburgh, Pa.**

New York Philadelphia Chicago
Boston San Francisco St. Louis
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When you buy

## Thomas Porcelain

you are sure to receive the

**HIGHEST QUALITY *and* QUICKEST DELIVERY *at* THE RIGHT PRICE**

Always specify THOMAS

**The R. Thomas & Sons Company**

Main Office, EAST LIVERPOOL, O.

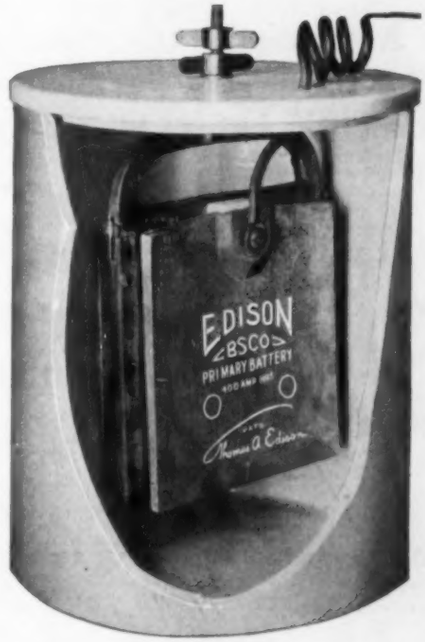
Factories: East Liverpool, O.—Lisbon, O.
Sales Offices: Chicago, Ill.—New York, N. Y.

# Clear Transmission, Always Necessary, Warrants Use of the Highest Grade Battery

A low internal resistance battery that will not polarize, and maintains constant voltage, is sure to give better results in telephone work than a set of cells whose voltage constantly drops when on discharge, or in which the voltage is high or variable.

## The Edison Primary Cells

maintain a lower uniform internal resistance than any other primary type; they furnish constant voltage and do not polarize at normal discharge rates; the 400 ampere hour size has a life greater than twenty single sets of dry cells, and they require no attention between recharges, even though the service is such that a period of years is required to consume their capacity.




Type No. 403. 400 A. H. Capacity

**Improve your service by installing EDISON**

Thomas A Edison

## THOMAS A. EDISON, INC.

**286 Lakeside Ave.** **ORANGE, N. J.**

# To Make Four Telephones Flourish Where One Phone Served Before

**With the minimum of installing expense—time, labor and material cost.**

**That, particularly at this time, is the chief interest of every manager. Let us help you.**

**A prominent telephone man was skeptical about party line service—in his town. He put his own phone, secretly, on a party line. It was six months before his wife discovered the fact. Good service!**

**It was Kellogg equipment that he used.**

**Do you know about the Kellogg Direct Harmonic System for magneto exchanges?**

**Its installation means better service in your plant. It means greater earnings. It means a larger income, because it saves you money in line building. It allows you subscribers you could not otherwise consider.**

**Now is the time to install the Kellogg Direct Harmonic System. Now is the time to work vigorously for more subscribers. Now is the time to ask our aid in getting these subscribers—at no expense to you.**

**We have served hundreds of our customers in this way. We may be able to help you.**

**We can furnish you free, or at cost price to us, original plates for illustrating advertisements in your local paper or circulars. Our lantern slides for picture houses are novel, and compel attention because they tell your message in a truthful, attractive way.**

---

**And, lastly, our standard magneto or common battery telephones represent you in the right way in each subscriber's office or home that you install them. They back up your switching service in a dependable way. They are your good advertisement, on duty twenty-four hours per day. They are "delivering the goods" for you reliably and economically. They are the cheapest telephones you can buy anywhere, because their operation proves them the best.**

---

**Last week a customer noticed one magneto set "in good condition," fourteen years in service!**

---

**Such telephones could cost twice their price and still be the cheapest on the market.**

---

**USE IS THE TEST.**

---

**Send in your order for one or more sets, or instruct our salesmen to have them shipped at once. Tell us or them, if you agree, that there is value in this subscriber-campaign idea we have expressed to you in this issue of Telephone Engineer.**

---

# Kellogg Switchboard and Supply Company

Main Office and Factory:—CHICAGO, ILLINOIS

Kansas City, Mo. San Francisco, Calif.

Canada West. Elec. Ltd., Regina, Sask.

Branch at Edmonton, Alberta

*New*

# BELDEN CATALOG No. 6

*Just issued*

***Ought to be in Your Files***

Contains detailed prices, psecific information about Belden products, besides useful wire tables and data.

***Write on your business stationery for copy if you have not received one***

**BELDEN MANUFACTURING COMPANY**
**2312 South Western Avenue CHICAGO**

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**Mailed Free of All Charge**

**For**
**Linemen**
**Electricians**
**Electrical Mechanics**
**Signalmen**
**Supervisors**
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**A Fine Christmas Gift**
**Is Klein's Pocket Tool Kit**

Case is of handsome black leather morocco grained or russet finish.

403K

**Kit Contains 7 Tools**

in constant use, each of superior quality. If unable to secure from your dealer, write us.

**Price, Postpaid, $6**

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Write for this Christmas Booklet and also for our general catalog.

**Mathias Klein & Sons**
**Canal Station 20 Chicago**

**Best for Year-Round and World-Round Service**

# The Harpoon Guy Anchor

Closed

You can drive the Harpoon through several inches of frost and have it all the way down and "set," before a fire, to thaw the soil, could be started.

Roots, stones and such buried obstructions as occur in made ground offer but slight resistance to the sharp, penetrating point of the Harpoon.

The Harpoon, because of its low cost, installed, is available for temporary, as well as permanent, anchorages for pole lines, smoke stacks, derricks, trestles, etc.

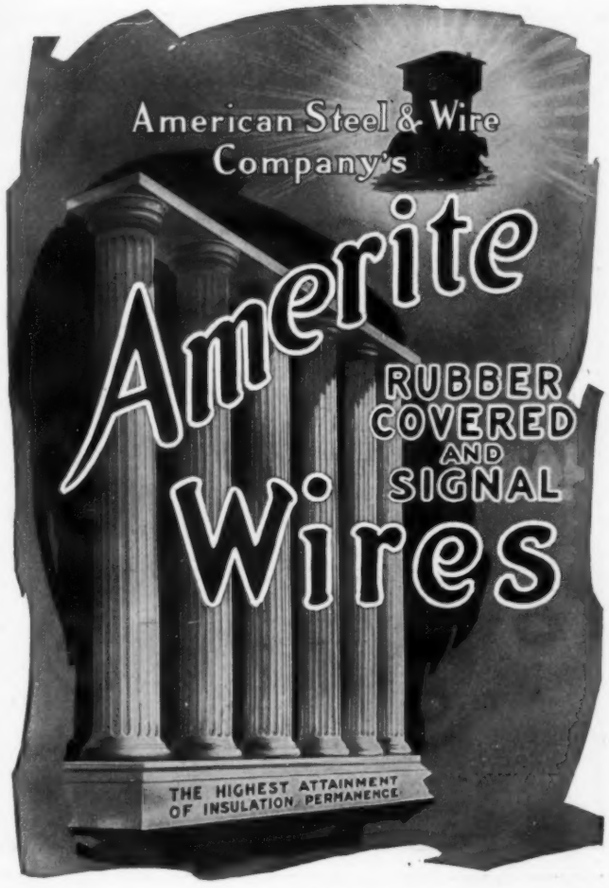
**Write for Literature on Anchors**

## Crouse-Hinds Company

**SYRACUSE, N. Y., U. S. A.**

**NEW YORK BOSTON CINCINNATI CHICAGO**

Open




WE present this wire as the result of many years of exhaustive research and test under *service* conditions assuring the greatest efficiency over the *longest period of usage.*

The specifications of this wire are adequate for the most **extreme requirements of indoor use** in high class structures as well as for the most **exacting outdoor exposure.**

**American Steel & Wire Company**

Chicago New York Worcester Cleveland Pittsburgh Denver

Export Representative: U. S. Steel Products Co., New York

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**Switchboard Opportunity**

No. 1 Western Electric Switchboard—5 Sections with 2600 Multiple each. 1600 Answering Lines, Power Machines, Supervisory Positions, Hayes Arresters and Storage Battery. Condition as good as new. Appraisal of $45,000.00 approved by Ohio Utilities Commission. Will be sold reinstalled if purchased at once. For particulars address

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*1029 Garfield Building,*
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**The National Conduit & Cable Co.**

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**41 Park Row, New York, N. Y.**

Manufacturers of

Bare Copper Wire and Cable
Weatherproof Wires and Cables
Paper Insulated Cables
For Power, Telephone and Telegraph

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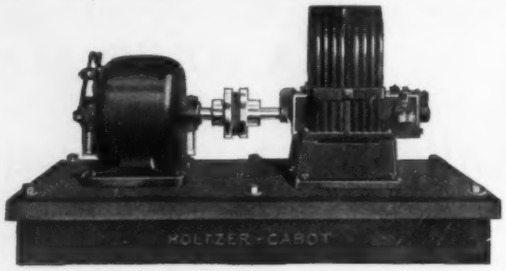


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"I expect to buy some kind of a ringing apparatus at once, and would like prices on a suitable equipment for my office. We have something near 230 town subscribers, mostly using 80 ohm bells, and about 140 farm phones, mostly 1600 ohm bells. We have a 110 volt A. C. lighting circuit in the office, and three operators during the day.

"If you have apparatus that will give satisfactory service, send it."

LET'S TAKE CARE OF YOU

*Bulletin 310E describes our machines*

**The Holtzer-Cabot Electric Company**

**Chicago, Ill., and Brookline, Mass.**

**Highest Grade of Inside and Outside**

**TELEPHONE WIRE**

¶ Made in accordance with the specifications of the Western Electric Company or those of any other customer.

**The Electric Cable Company**

**17 Battery Place, New York**

**Boston** **Chicago** **Cleveland**
**Philadelphia** **St. Louis** **San Francisco**

**Works: Bridgeport, Conn.**

**BURNS EXPRESS SWITCHBOARDS**

**SAMSON TELEPHONES**

**World Famous**

**Transmitters, Receivers, Generators and all Standard Telephone Apparatus**

**GET OUR CATALOGS NOW**

**American Electric Company**

**MAKERS OF HIGH GRADE TELEPHONE APPARATUS**

**State and 64th Streets, (Englewood Station) Chicago, Illinois**

Model 159

Model 24

*For D. C. Telephone Circuits—*

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**SWITCHBOARD**

**AMMETERS and VOLTMETERS**

**Weston D. C.** permanent magnet moving coil instruments are the recognized standard for direct current service. Manufactured in appropriate sizes and capacities for telephone use; absolutely reliable.

**Weston Eclipse** switchboard ammeters and voltmeters are of the soft-iron or electro-magnetic type, and are far in advance of all preceding forms of this type. Especially suitable for small plants, because they combine great accuracy with low cost.

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(CONTINUED ON PAGE 11)

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"Blow-Rite"

Made in wood, porcelain and fibre to fit all standard Arresters and Terminals.

Lined with "BLOW-RITE" fuse wire, which has great tensile strength and accurate fusing characteristics.

"Blow-Rite" Fuses Are Guaranteed By

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Non-Breakable Messenger Hangers
are safe

and save you money

Installed with one through bolt
Hot Galvanized

Are You Using Them?

National Telephone Supply Co., Cleveland, Ohio

PARANITE

RUBBER COVERED
TELEPHONE WIRES

for every conceivable use.
Braided, Leaded and Iron Armored Telephone Cables, Conductors straightway or paired.

Manufactured by
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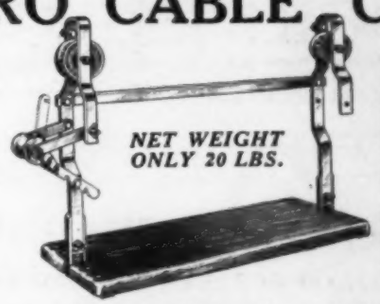
"AERO" CABLE CAR

Made entirely of Steel—Sherardized.

Pick-up Attachment Holds Cable in Place.

*Write for Catalog and Prices*




Can be Knocked Down to 4 Parts, and Easily Carried. Bolts are Upset to Prevent them from Becoming Lost.

The Fairmount Elec. & Mfg. Co., Philadelphia

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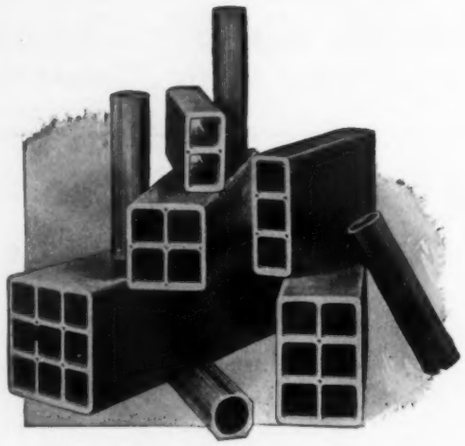

Specify either of the above standard makes when writing your underground specifications.

Factories East and West, enable us to figure reduced freight rates, assuring you of the lowest delivered prices without sacrificing quality in any way.

Large stocks of both single and multiple duct constantly carried, thus insuring an early delivery.

Our conduits have been used for over twenty-three years. Inquire about us in any city where conduits have been installed.

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CONSULT us when in the market. We have patterns and carry stock of standard sizes.

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## "How to Read Telephone Circuit Diagrams"

There are 270 pages, 5¼" x 7½", beautifully printed on egg shell paper; 570 illustrations of symbols and circuits; silk cloth and gold binding. If you want to know how to read a blue print, you will want this book. It's $1.50 prepaid.

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Manufacturers of
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*Write for Catalogue and Price List Just Issued.*

*Note Protection at Corners*

## Blake Insulated Staples

Unequalled for telephone and bell wiring. The fibre insulation prevents troublesome short circuits and grounds. 5 Sizes. Pat. Nov., 1900. Write for Samples.

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BOSTON, MASS.

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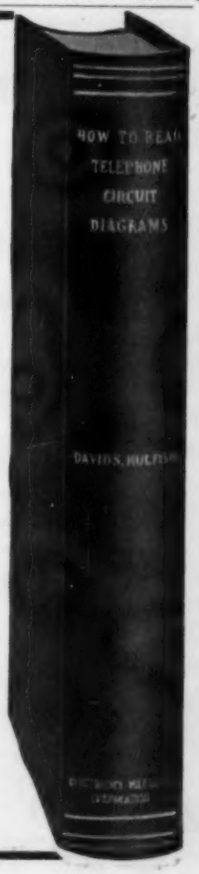


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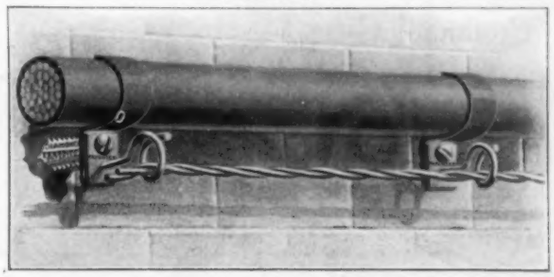

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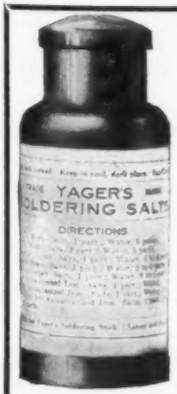


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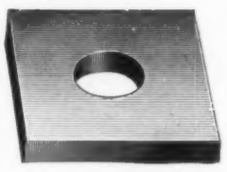

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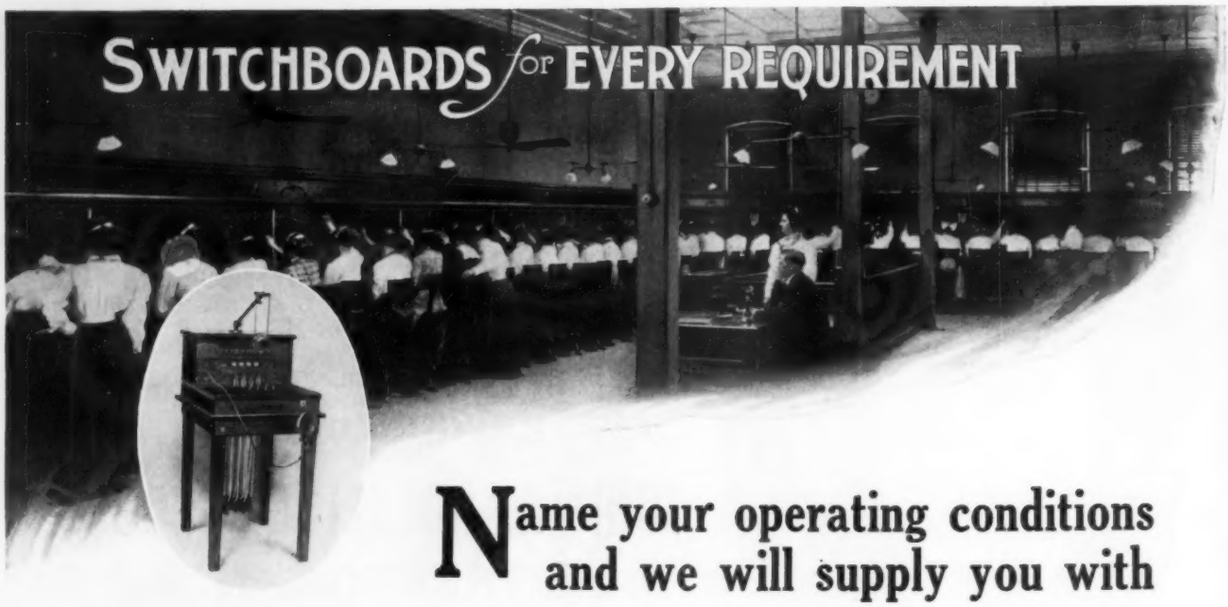


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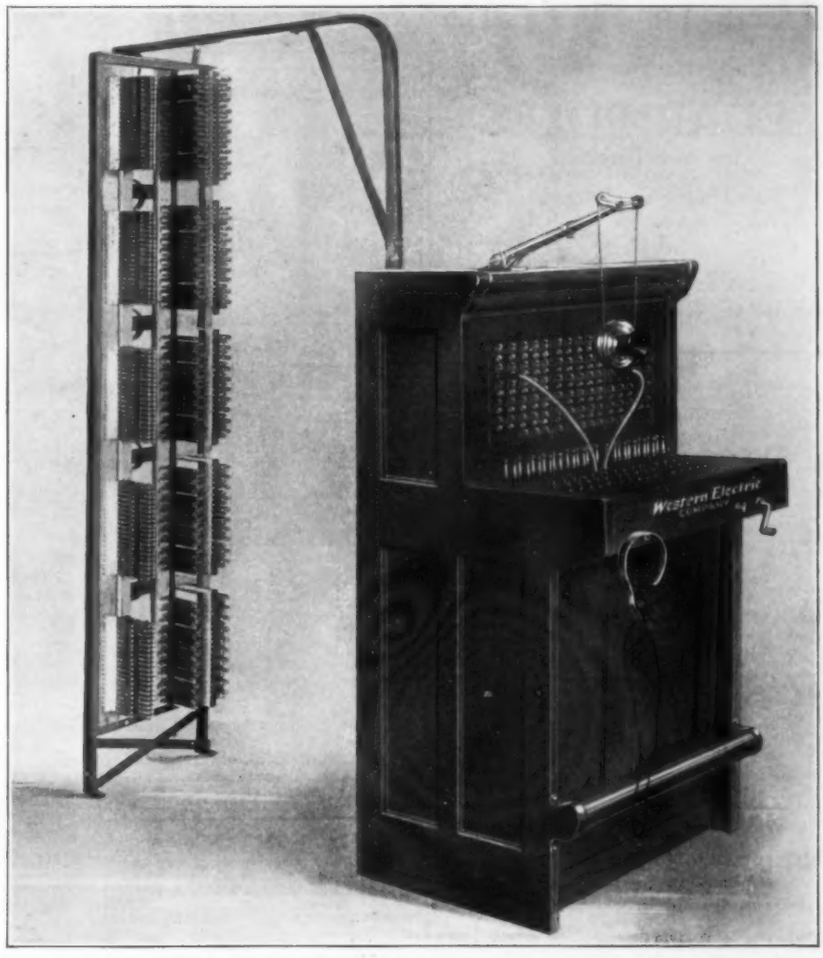


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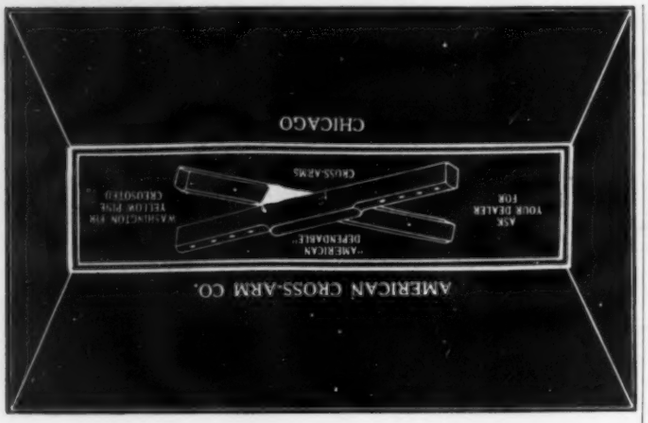


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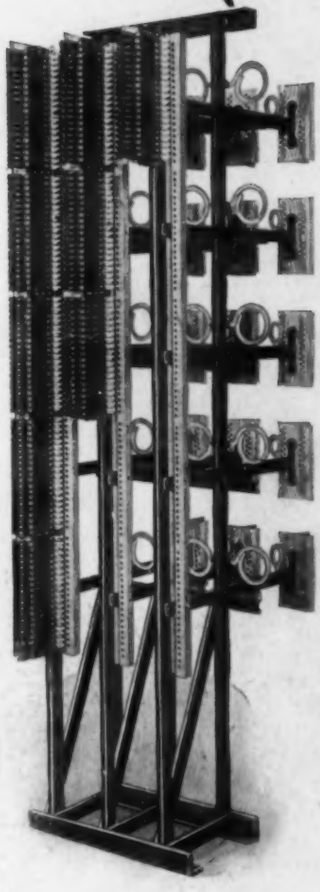

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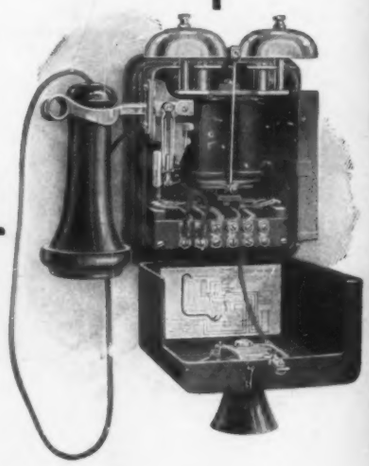
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